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Nature in Print

By HOWARD ZAHNISER

Camping Can Be Fun is about as intriguing a title as one is likely to run across in the midst of a most wintry January, and the Robert W. Weaver-Anthony F. Merrill book that bears it is sure to be one to raise the spring fever of anyone who comes across it after the frost has left the ground. It was a curiously appropriate volume to take in hand right after reading John J. Rowlands' *Cache Lake Country: Life in the North Woods.* Mr. Rowlands and his illustrator, Henry B. Kane, who have been practically collaborators, have created a book that makes the living room in the city in winter seem both cozy and much too civilized. One remembers in reading it the dreams of boyhood and the fascination of all catalogs, outdoor magazines, and books of camping, woodcraft, and life in the woods. One hardly knows as he feels the spell of *Cache Lake Country* whether it could possibly represent any reality, creatures as we are of the city and the civilized life we Americans have created. And then, with the sophisticated charm of a lobby or living-room conversation, *Camping Can Be Fun* makes outdoor living—in season, of course—seem to be quite the thing, indeed, the really American thing to do, for a vacation.

We Americans are still frontiersmen at heart. At least we seem to carry always with us deep recollections of wilderness emotions. There may be no remembered incidents in our own lives or in the tales of our parents or grandparents. Yet such a subtitle as *Life in the North Woods* seems always to stir some sort of nostalgia, and there is joy in being reminded of the romance that has survived the difficulty and distress of our ancestral life in the clearing. Here in *Cache Lake Country* is a reminder of a remembrance that is an inspiration, an evidence of a part of ourselves that we wish never to forget.

There will always have to be men like John J. Rowlands who will live for each of our generations the life of the woods in its fullness, and dramatize for us the reality of our origins, and there must always be the vast stretches of wilderness that they will require. As such a champion Mr. Rowlands has meaning for all of us. His introductory chapter is entitled "Portage to Contentment." The rest of the book is a chronicle of a round-year, broken into a dozen separate discussions with the names of the months for titles. It would be a specious contentment for the mass of the readers of the book, appreciative as they will be, and few are those who could well spend many such years. Yet, paradoxically, we shall all be better by sharing Mr. Rowlands' recollections of his north-woods life with only two neighbors—an Indian and Hank, who each lived in cabins neither too near nor too distant. (It is Hank who is Henry B. Kane, who drew the beautiful and effective illustrations that occupy many full pages of the volume and adorn nearly all the margins.) We have in the contemplation of this life in the woods an opportunity to correct some of our civilized excesses, just as *Cache Lake Country* brings a message of naturalness into our civilized living that is so readily labeled as artificial.

"Time," observes Mr. Rowlands in one notable comment, "is a strange standard of measure, for its value changes so much, depending on what you're doing and where you are. In the city most folks are slaves of minutes and hours. Time tells them what to do and when to do it. Here in the north woods it is different. It is not the hours or the days, but what happens at various seasons of the year that counts. Time is a snowstorm, a downpour of rain, a day in spring, mosquitoes, and black flies. Time may be a dry spell or a forest fire, the freeze-up or the day when the ice goes out. In nature time doesn't trot right along. Often it stops for a while and sometimes backtracks on its own trail. It loafs along in winter and hustles in the spring and summer."

The editor of this magazine, like others who are responsible for the orderliness in our civilized way of living, would not wish to have the writer of this page be so influenced by these comments as to fail to have these words on paper in his hands by a certain time. Yet all of us would probably be richer in accomplishment and in contentment if we looked on our so-important promptitudes from the perspective of time as perceived in the north woods. Perhaps our total doings, in the duration of eternity that is lived by each of us, would be more consequential if we were less conscious of the time spent on each act and were more concerned with the fullness of each doing. At least—and here is the significance of Mr. Rowlands' testimony—it will do us all good to think long enough of the realities of time to temper our haste.

It is, of course, not important that all of us personally live so long in a wilderness. It could hardly be otherwise, for there is not wilderness enough. Mr. Rowlands' Cache Lake, he says, "is protected by distance, mile after forgotten mile of woods and water," and if all of us should strike out for his neighborhood this protection would surely vanish soon and the lake would no longer be "still clean and clear and safe from civilization." A few from each generation may thus know the full-length life of the deep wilderness, but the rest of us may well depend on the words that come back to us—and on the briefer experiences that vacations can afford. Important it is to realize that some actual experience of one's own, some real taste of the wilderness in its objective existence, is essential if we are to comprehend those words that do come back to us, or down to us, from the wise men who live in the wilderness. Important it is also that we cherish the comments of such men as Mr. Rowlands—and cherish too the areas that will make possible tastes for the multitudes and deep draughts for the solitary few of the future.

Intensely and immediately practical, then, is such a book as *Camping Can Be Fun,* for it deals with the means by which so much of the outdoors as is within the reach of all of us can be experienced. "The good woodsman," says Mr. Rowlands, "is a man who takes what he needs to live comfortably," and perhaps the most interesting parts of *Cache Lake Country* are its many descriptions of devices and ways and means for comfortable living. (Its directions and their illustrations should keep a "handy man" busy throughout the year.) Similarly *Camping Can Be Fun* is no psychological discussion on how to endure hardships, but, rather, a merry and highly informative book-length chat on how to live in the outdoors for a vacation, and enjoy it. "We insist," says its preface, "that physical comfort is of prime importance in the woods," and fortunately, also, the book's advice throughout is based on the frank understanding that no one needs to be loaded down "with a multitude of heavy and complex camping equipment" in order to enjoy the outdoors.

An Idea to Ponder

By ETHEL ROMIG FULLER

What is it in a man that sends a feeding bird
Off on sudden-frenzied wings? There was no word
Too loudly spoken; nor hand abruptly stirred . . .

A flock instinct of snares? A powder-acrid scent?
(Always between the personal, friendliest intent
And avian yearning to be friends, *some* impediment.)

A mystery! Or isn't it? Man might find a clue,
Did he once dare to risk a bird-keen bird's-eye view
Of himself. Who knows, then he were startled too?

Anyone who is contemplating a camping trip (and who among the readers of this page is not?) will surely realize their time and money's worth from *Camping Can Be Fun.* Those who are novices and read it before camping will never cease to be thankful, and any experienced camper will get from it the same critical enjoyment that he gets from listening around the campfire to any good talker expatiate on what to the camper is the most interesting and controversial subject in the world—how to camp.

In addition to the expected essentials are such subjects as those in chapters with such titles as "Into Each Life . . ." (which a reviewer hesitates to identify as dealing with rain), "Things That Go Bump in the Night," "Fun with the Wildlife," "Time Out, for Good Behavior," "Advice for Stray Lambs," and "Trip Lightly Down the Trail." The many and multiplying nonhunters who go camping will be pleased to note also that here is one book that does not assume that one must be a hunter to be an outdoorsman—a volume that does not include killing as part of the "Fun with the Wildlife."

Camping Can Be Fun is concerned not only with what to do and how best to do it, but also with the areas that are available to the general public. Appropriately enough, it speaks also a strong word for the preservation of these areas, and the wilderness areas as well, where the beginners of today may wish to spend their week-ends of day-after-tomorrow.

"In presenting this book the authors," says the preface, "have one main hope for its usefulness: that it will bring more Americans out into their forest playgrounds and that once there they will enjoy the experience as much as we always do. It is our further hope that those who read this book and use the forests will grow to understand their precious value and will contribute their democratic influence as responsible citizens to the maintenance and promotion of a sound national conservation policy."

Cache Lake Country: Life in the North Woods. By John J. Rowlands. Illustrated by Henry B. Kane. New York: W. W. Norton & Co. 1947. 272 pp. Index. $3.50.

Camping Can Be Fun. By Robert W. Weaver & Anthony F. Merrill. Illustrated. New York & London: Harper & Brothers. 1948. 241 pp. including index. $3.

Australian Birds

Australian Bird Life. By Charles Barrett. New York. 1948. Oxford University Press. 239 pages. Illustrated in color and black and white. $3.25.

This is not a field guide to Australian birds, but a popular and readable discussion of the continent's avian life. Nearly seven hundred species have been recorded for Australia, and these contain birds of outstanding beauty of plumage, as well as birds of unique habits of life.

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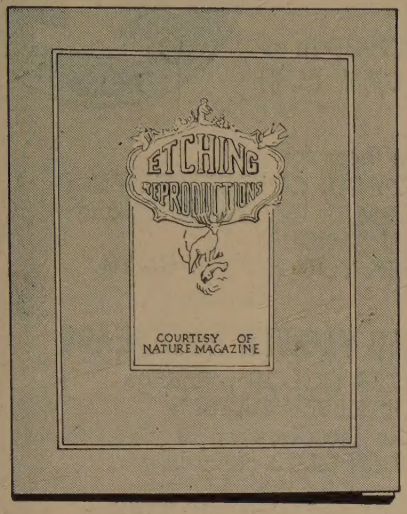

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Quests and Quizzes

Nature Quests and Quizzes. By Raymond T. Fuller. New York. 1948. John Day Company. 64 pages. $1.50.

Here is a very different little book, which we had the privilege of seeing in preliminary form. Commenting, we said: "Here is one of the most interesting and stimulating eye-openers to Nature. It should make an inquiring Nature enthusiast of the average individual." Now that the finished book has come to hand we have no reason to change our estimate. In it the author presents one hundred different quests calling for investigation by the reader. It is then wholly up to the reader to carry these out, aided by some hints the author gives to start one on one's way. Then there are one hundred quiz questions, to which the reader will find the answers—if he turns the book upside down. This book would be fun for anyone, and should have a special use for youth and group leaders.

R. W. W.

For the Blinded

Hitting the Dark Trail. By Clarence Hawkes. Holyoke, Mass. Manser Printing Company. 176 pages. $1.00.

Clarence Hawkes, blind poet and author of Hadley, Massachusetts, has written thirty-five animal and Nature books, but *Hitting the Dark Trail* cannot be classed in either category. First published as a brief, autobiographical article in *Outlook* magazine in 1909, it focused wide interest upon the life of this friend of Helen Keller. As a consequence the article matured into a book for the enlightenment of those who wished to know more about the author, and the encouragement of those who, like him, have lost their sight. It tells of a farm youngster with an unusually keen appreciation of every phase of Nature who lost his sight as the result of a hunting accident, and came through the total darkness of despondency "to make better optimists and fighters" of those similarly afflicted. In 1918 an edition was published in French braille for five thousand blinded French soldiers of World War I, and in 1946 another special edition was published at the author's expense for the inspiration of fifteen hundred blinded servicemen of the second World War. But it is also a book for those who can see, yet seek a reason for observing and appreciating the world surrounding them; written by a man blinded for sixty-four of his seventy-eight years and still able to smile.

S. V. H.

Flower Drawing

Drawing Flowers. By Victor Perard. New York. 1948. Pitman Publishing Corporation. Illustrated. $1.00.

This is one in the series of practical helps to those who wish to draw, in this case flowers. Attention is also given to the use of flowers in design.

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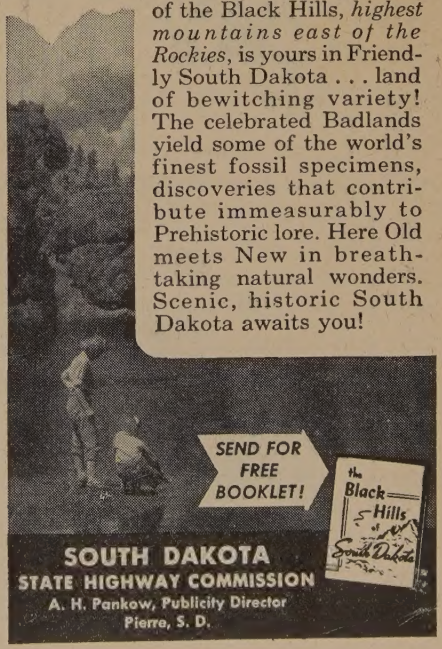

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Contents Noted

FROM one of our readers comes an interesting suggestion bearing upon the subject of the small wildlife sanctuary and the problem of its protection from trespass by gunners and others. Our correspondent suggests that the owner of such a tract could obtain a deputy warden's badge from the proper authorities, and, thus armed, keep people off his property. It is pointed out that such a badge carries with it authority to arrest trespassers. This is an interesting idea, and one that we hope some of our sanctuary-owning readers will investigate so far as their own States are concerned.

●

WE are indebted to Elsie D. Burgan of Washington, D. C., for having found a protest against snaring birds made by Martin Luther in 1534. Luther had discovered that a servant had rigged up a snare, so he wrote, anthropomorphically, a letter to himself from the birds: "To our gracious lord, Dr. Martin Luther, preacher at Wittenberg: We thrushes, blackbirds, chaffinches, linnets, goldfinches, together with other pious and honorable birds who are to journey this autumn over Wittenberg, beg to advise your Reverence that we have been credibly informed that one named Wolfgang Sieberger, your servant, having determined upon an act of great and cruel boldness, out of anger and hatred for us, has paid a high price for some old, worn-out nets that he may rig up a snare and take away not only from our friends the finches, but also from all of us, the liberty given us by God to fly in the air and gather grains of corn on the ground. He also seeks our bodies and lives, although we have done nothing to harm him and have not earned such a sudden and serious attack from him. Since all this, as you can well imagine, is very hard for us, poor free birds, who have no barns, nor houses, nor anything in them. We humbly and civilly beg you to induce your servant to abandon his designs, or, if that be impossible, persuade him to strew corn on the traps the evening before and not get up and visit them before eight in the morning. We will then make our journey over Wittenberg. If he will not do it, but insists so cruelly on seeking our lives, we will pray God that he may be repaid by finding in his trap when morning comes, frogs, locusts and snails, instead of us, and at night be overrun with mice, fleas, lice and bedbugs, and so forget us and not take away our freedom of flight. . . . We place our cause before the bar of reason. . . ."

●

THE latest volume of the Proceedings of the Indiana Academy of Science abstracts a paper on "The Control of Certain Insects by Eliminating Their Animal Vectors," by Milton Caroline, of the U. S. Fish and Wildlife Service. Fleas, mites, and ticks, it notes, can be more easily controlled by eliminating their animal vectors. Special attention is given to the control of rodents and birds. Coming from an organization addicted to "control," this has an ominous ring. A method of combatting fleas and ticks so indirect and so expensive of life should not be tolerated except in a grave emergency affecting public health. We trust that this obscure notice of further intent to kill will not be overlooked by conservationists, and that as individuals and organizations they will let the Fish and Wildlife Service (Department of the Interior, Washington 25, D. C.) know what they think of this flimsy pretext for augmenting its "control" program.

●

HUNTING license sales for the year ending June 30, 1947, totalled 12,066,763, a figure that Albert M. Day, Director of the United States Fish and Wildlife Service, describes as an "incredible peak." He adds: "Maintaining a supply of game birds and animals to withstand this heavy drain is the chief problem that confronts the country's wildlife administrators today." It is, indeed, a problem, and one that concerns not only the wildlife administrators, but those who are interested in our wild birds and mammals for their beauty, interest and place in our fauna. We are faced with a terrific hunting pressure that threatens to make much of our country a faunal desert. The promotional activities of the States seeking to sell more and more licenses to more and more gunners; the advertising promotion of the arms and ammunition manufacturers and the gunners' magazines; the activity of gunner organizations to increase their membership and influence, have all combined to rear a Frankenstein. Although pressures have already over-reached themselves, there is every indication that the figures for June 30, 1948, will show an even larger number of gunners. The law of diminishing returns, however, must soon begin to operate. The future for our wildlife is blacker than wildlife administrators have the courage to admit, or the gunners have the eyes to see.

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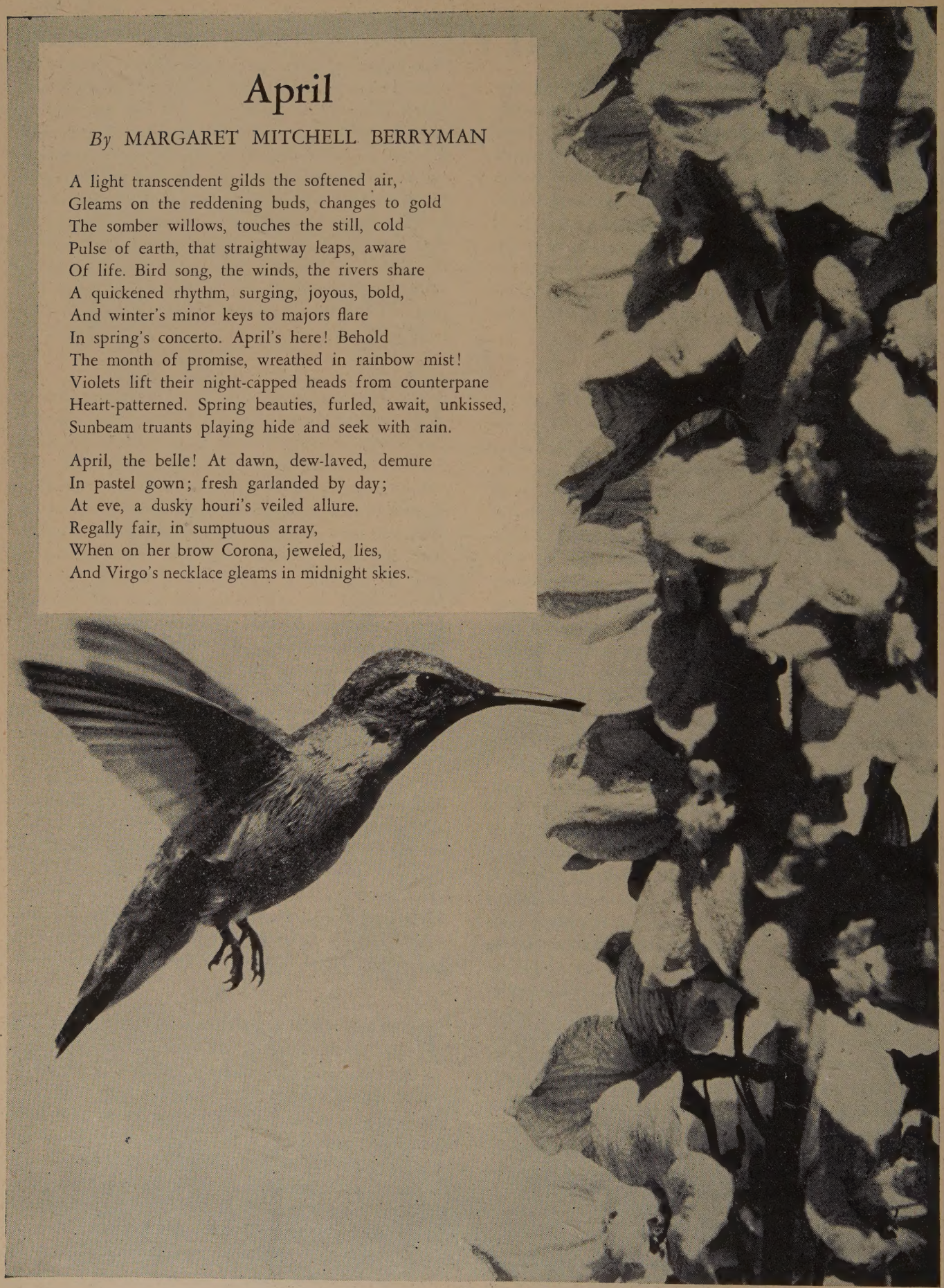
PART and parcel of the promotion of hunting pressure on our wildlife are such advertising dodges as the Flying Hunter Club, whelped by Eastern Air Lines. The Flying Hunter Club has a big game division with an Annual Rickenbacker Trophy for members who have bagged the biggest deer, bear, wild boar or elk. There is a migratory and upland game birds division, in which awards are made to members of the Flying Hunter Club "who makes the greatest number of trips over Eastern Air Lines for the purpose of hunting migratory and upland game birds. . . ." Well-heeled gunners can now migrate with the birds, getting limits day after day—and a nice bronze plaque from Eddie Rickenbacker. R. W. W.

April

By MARGARET MITCHELL BERRYMAN

A light transcendent gilds the softened air,
Gleams on the reddening buds, changes to gold
The somber willows, touches the still, cold
Pulse of earth, that straightway leaps, aware
Of life. Bird song, the winds, the rivers share
A quickened rhythm, surging, joyous, bold,
And winter's minor keys to majors flare
In spring's concerto. April's here! Behold
The month of promise, wreathed in rainbow mist!
Violets lift their night-capped heads from counterpane
Heart-patterned. Spring beauties, furled, await, unkissed,
Sunbeam truants playing hide and seek with rain.

April, the belle! At dawn, dew-laved, demure
In pastel gown; fresh garlanded by day;
At eve, a dusky houri's veiled allure.
Regally fair, in sumptuous array,
When on her brow Corona, jeweled, lies,
And Virgo's necklace gleams in midnight skies.



FEMALE BLACK-CHINNED HUMMINGBIRD. PHOTOGRAPH BY JOHN LINDSEY BLACKFORD.

Sippers at the Sap Wells

By JOHN LINDSEY BLACKFORD

Photographs by the Author

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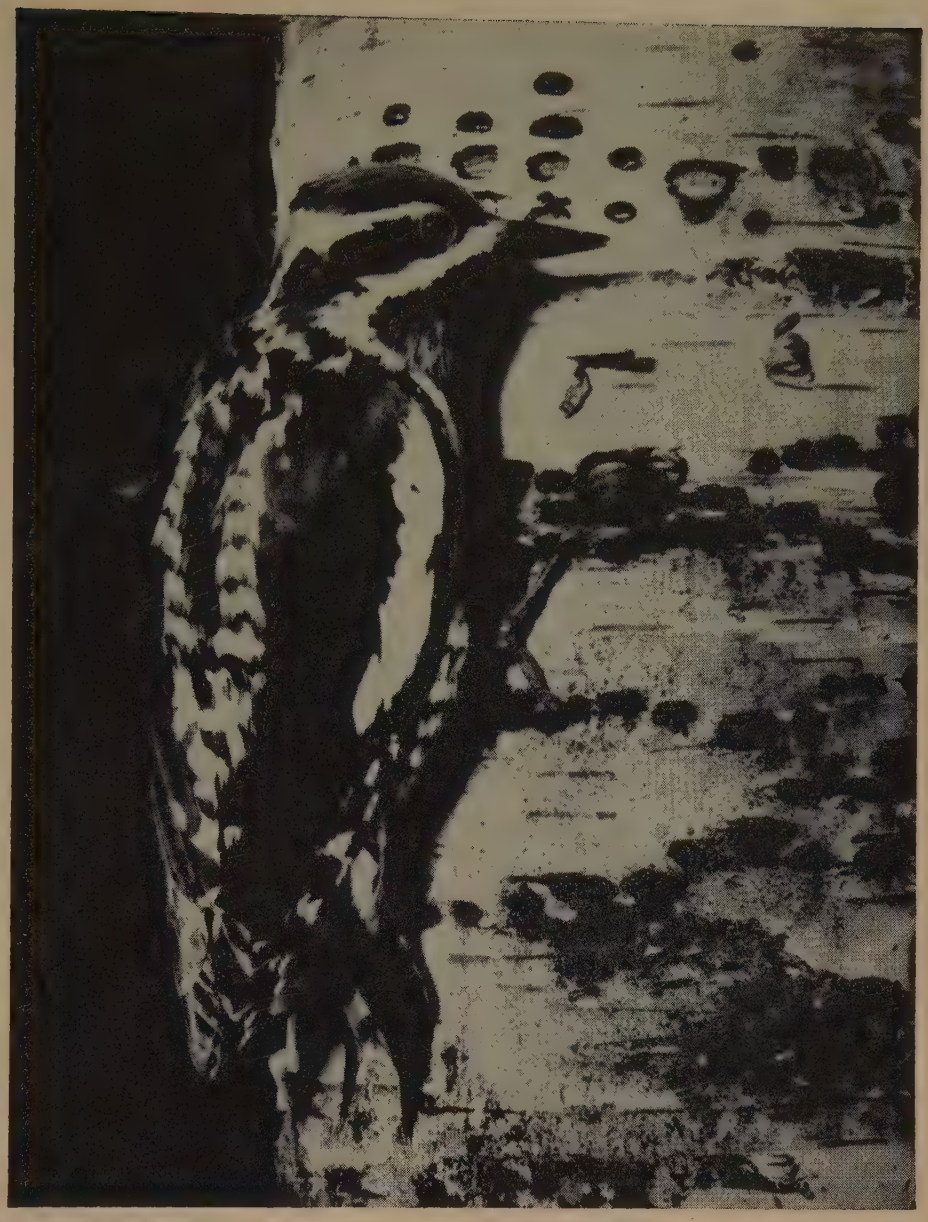
The red-naped sapsucker was the proprietor of the sap wells that attracted a varied group of customers.

★



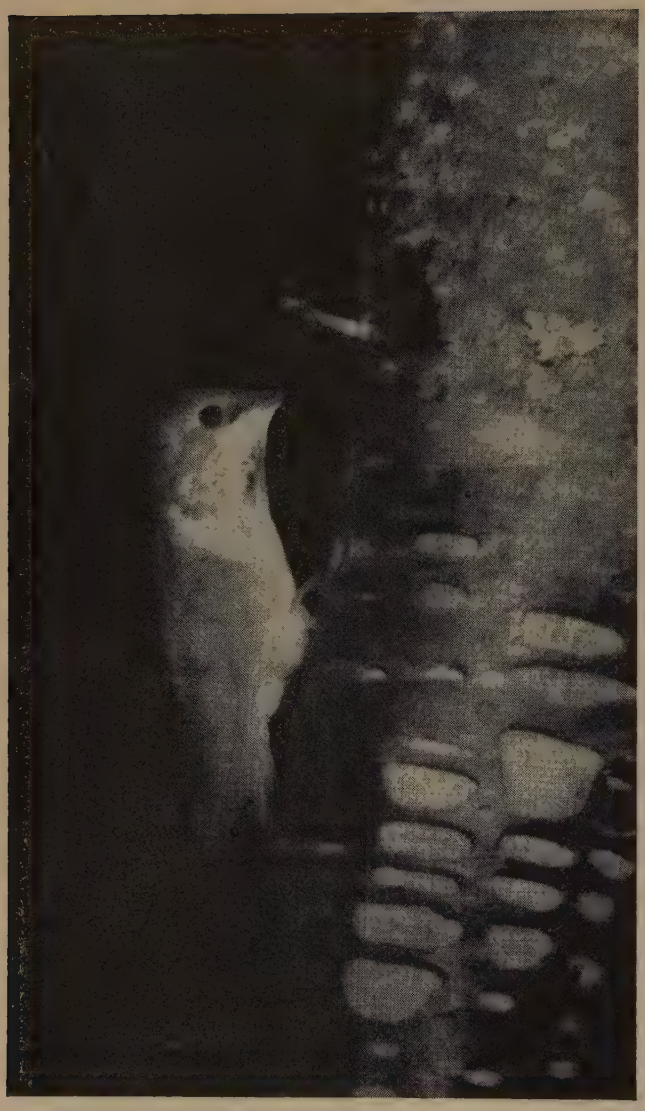
THE story of a red-naped sapsucker, his housing problem, how he solved it, and the soft-drink emporium of which he was proprietor begins, not with his own arrival, one twenty-eighth of April, but with the domestic activities of a red-breasted nuthatch. It was the last day of the month when I saw her digging in an old black birch stub of sizable diameter. The birch had decayed to a state of punky solidity, admirably suited to a diminutive excavator; and the little homemaker, laboring energetically, had already penetrated to a depth nearly to hide her within the circular doorway.

By the first of May, leaves were just fringing the birches, maples were in profuse bloom, and small bees made a big hum about green willow catkins. Housebuilding had also become the concern of many male sapsuckers. In a grove of tall aspens upriver, one bird was neatly outlining the entrance to his new abode. In a deep gulch where snow lingered on the trail, another occupied himself upon the trunk of a hemlock. A few days later I found Red-Nape at work forty feet up on a tamarack in the vicinity of the nuthatch nest site.

Next morning this small, hurrying home-builder could only be brought to her door by determined knocking on the base of the birch. The tall stub forked at a height of eighteen feet; the double top had broken off somewhat higher. She had selected a spot just beneath the fork and the cavity benefited by a southern exposure. Later, as nearby boughs came well into leaf, the surrounding greenery promised a pleasant variation of sunshine and shade. The ground beneath was dusted with fine, punky splinters, it being nuthatch custom to drop material, first removed, from the edge of the doorway.

Later I noticed the handsome sapsucker hanging interestedly about the nuthatch veranda. Both nuthatches were vastly perturbed, the male at last proving himself of some assistance. They flitted and jerked, back and forth, about the intruder, their musical piping changed to a succession of short, spark-like notes that telegraphically expressed dire agitation.

On the eighth the sapsucker clung conclusively at the entrance, and neither nuthatch was seen there. A hundred feet away I observed a redbreast hurriedly hammering upon a smaller birch, but she did not yet have the circular aperture rounded out and the site appeared to be a poor one. Red-Nape himself no longer visited his early high location on the tamarack. The new nuthatch site proved unsuitable, and after



twenty-four hours the troubled pair wisely removed to a distance.

Two days later I returned to hear digging in the high hole in the birch stub. I tapped on the old tree with a pole, but the occupant, undisturbed, continued his work. Again I knocked vigorously. There ensued a discreet silence before the sapsucker appeared, studied me intently, and flew away. As he squeezed from the round entrance, it was obviously a tight fit.

On the thirteenth the female sapsucker appeared and kept much in his company at the nest hole. Likely Red-Nape presented the project as his own accomplishment. He stayed beside it much of the day, proudly preening himself. Although the lazy rascal seemed considerably large for the passage, he did not widen his doorway.

It must have been with knowledge of her mate's proclivities that Madam Red-Nape carefully examined his purported handiwork. Her critical eye detected the subterfuge, with results at once in evidence. On the same afternoon, aroused from his siesta, he was seen starting a new cavity about two feet above the first, located in the larger of the two forks and facing west. The same quality of the stub, its punky-solid condition, previously attractive to the nuthatches, evidently pleased Madam Red-Nape. Consequently the leisure-loving male did profit in a measure by his claim-jumping. Excavating here required little effort compared to chiseling in the live tamarack, and by nine on the following morning he was in to his middle in the upper hole in the birch.

As the work progressed I began better to appreciate his motive in presenting his mate with a refinished apartment. A week passed, and, in spite of the soft nature of the wood, the dwelling was far from complete. When I tapped on the tree, the busy carver ceased hammering, only to center attention upon a clean up of the premises. Twenty-two showers of "sawdust" came sifting down in succession from the new location as the occupant brought large billfuls of splinters up from the floor of the hollow and shook them from his mouth at the doorway.

Another week and I surprised the female sapsucker hammering in the hole. When I thumped repeatedly upon the foundations of her airy home she emerged, but her manner showed her anxious to reenter at once. Soon Red-Nape arrived, and took her place. He began removing punk and slivers, carrying large mouthfuls to a larch twelve feet away. As with the nuthatches, when the ground beneath becomes littered with waste, the debris next removed is usually carried off to some distance.

At the left a calliope hummingbird patronizes the sap wells on a mountain alder, and, below, a red-breasted nuthatch explores the possibilities of a canoe birch.

A pine squirrel found the provender of the sap wells enticing, and added variety to the visitors who came to sip.

These first six loads taken to the larch were dropped there. Each trip proved an involved process. The red-bibbed dandy emptied his bill, leisurely scratched the corners of his mouth, wiped his beak carefully, and preened himself. Returning, he threw several more loads from the hole and withdrew from sight. Following a silence lasting five minutes, he flew to the larch with another billful, the fourteenth in all. Again he was silent. Apparently he hoped to rid himself of his timekeeper, but, failing, finally tossed out another shower of splinters from the cavity.

Upon his early arrival in spring my sap-sipping friend had at once renewed acquaintance with several familiar resorts. He reopened his old wells located in nearby birch and willow-clumps and enlarged their area upon the trunks.

Of mornings his wild primal cry, stirring one's long forgotten associations with the primitive, was heard in the early dawn, followed by rapid drumming. The tattoo always terminated characteristically, with several scattered taps trailing oddly and abruptly to a close.

When devoting his time both to love-making and a free-flowing bole, Red-Nape becomes a noisy fellow. His rolling drum-beat echoes loudly in deciduous glades. A catbird-like mew startles the wanderer-by. But these are preliminaries. After a pair of sippers get full of their brew, the affair becomes a raucous party. Close observers assert that the heat of the sun ferments the sap the birds imbibe. Certainly their weird cries and squawks heard in the northern woodlands are not surpassed by any save the occasional midnight seances of great horned owls.

The round or squarish punctures of the sap wells may be seen in the bark of alder, aspen, birch, maple or willow, and, less frequently, upon conifers. The cambium layer is consumed, and insects attracted to these "soda fountains" are caught in numbers. Only the activities of the yellow-bellied sapsucker and of Red-Nape, his cousin, are considered harmful, but for their useful work as insect destroyers they are accorded protection. On lawn trees a little paint brushed over their abrasions often discourages them from further effort.

From a shy fellow who first peeked at me warily from around his treetrunk, Red-Nape became, at his soft-drink establishments and at his nest hole, a friendly toper more concerned with the business in hand than he was about visitors. He had many, for his "concessions" were the resort of numerous once-respected citizens of the wood. Of these he always took precedence, and none questioned his proprietorship.

One day I registered guests at Red-Nape's favorite wells deep in a birch clump. A red squirrel was imbibing the sweet liquor. Appropriately, blue bottle flies swarmed about the brewery. A hornet arrived in addition to his usual patrons, the yellow jackets. A calliope hummingbird maintained her regular attendance, while among butterflies present a Lorquin's admiral hastened to sip daintily. As I left, the next coming to "singe her wings about the flame" was a mourning cloak.

During the first half of June, Red-Nape was his own best customer, and, judging by continued trips to the nest a hundred feet away, he carried sap and cambium to his mate also. Whenever off duty she came regularly to sip at the sap fountains.

Honeysuckle, wild rose, and mountain balm bloomed. Young robins were on the wing. The red-eyed vireo began his cycle of siren song. On the nineteenth of June loud cheeping emanated from the nursery. So vociferous grew the chorus day by day, that I expected some enemy to discover them, yet none came.

It was almost the Fourth of July when the sapsucker young first peered from their round doorway. About them waxen birch leaves glistened; a giant larch shaded in the afternoon; below their tree-house a small pool mirrored the nest hole. The tall stub was

lichen-grown, with bracket fungi stepping up around its peeling stem. A last-year's warbling vireo cradle swayed on a nearby limb.

On the Fourth the celebrants at the birch clump included two pine squirrels and several calliope hummers. A pair of redstarts took toll of tipsy flies.

Two black-chinned hummingbirds whizzed about the sap cisterns. The male's gem-like throat blazed metallic violet wherever sunbeams trespassed in the shade. His mate dazzled as she drove the star hummers away. About them yellow jackets droned angrily. Often they rose and gyrated in tentative aerial combat with the smaller hummingbirds, but in this midget vixen they more than met their match. She was never routed when she wanted a highball.

These chrome-vested customers had a still more implacable enemy in the hornets. The big, blue, short-tempered fellows would go aboard an offending wasp, and quickly jab him with their long, deadly needle. The "jacket" would lose his grip, and tumble to the ground, to crawl slowly about in a poisoned, dull-witted stupor.

I might approach within a few feet of Red-Nape when, with specialized tongue, he brushed up the delectable contents of his wells. Sometimes in that "joyous errand" as he made the rounds, he would reach a spot no more than arm's length away, and possibly, since I sampled his sap but seldom, he regarded me with special favor. For that reason, on the other hand, he may have merely regarded me as one of the duller habitués of his popular establishment.

As proprietor of the birch brewery, Red-Nape was often occupied in bringing in new wells to meet the pressure of increasing business. The thirst of customers and fledglings alike kept pace with the mounting heat of midsummer; and usually his cider cisterns were dry as a well-regulated desert.

Soon his youngsters began coming out to scatter through the dense greenery in the vicinity of the birch clump. They were fully feathered, and, except for immature coloration, hardly marked as initiates.

The season mounted to its height. Young calliopes filled the air with blurred wings. Gleaming iridescences of the black-chins gave the resort its gayest aspect. Like firebrands, the redstarts scintillated orange and flame. The junior red-caps all proved as successful inebriates as my happy friend, who left with them at last on his August vacation.

I glimpsed Red-Nape again in late September. His subdued conduct seemed to reflect the slackening flow of sap from the birch reservoirs. Likely in his emptied cup he sensed as well the slackening of the year. Butterflies, aware of summer's imminent end, came in numbers, hoping perhaps to recall gay hours of carousal. Soon November and death would quench their cheer.

Yet always spring returns. When the sap rises and the buds swell, when the opening flowers breathe fragrance, and bright wings flash overhead, Red-Nape reopens his sweet-flowing fountains. And unless you are wholly a teetotaler you will hasten to join him there, if only just for that "pause that refreshes."

Fluid Azure

By IRENE STANLEY

Finding
this bluebell glade
suddenly, would not you
too have thought these waves were water
blowing?

A Nighthawk's Duet

BIRDS that make sounds with their wings as well as by voice have long puzzled uninitiated observers. Among American birds having both talents is the nighthawk. This misnamed species (for it is no hawk) is most familiar through its expert but erratic flight at eve or preceding storms. Its long, narrow, angled wings, from the presence of a large white spot in each, sometimes appear as if perforated. Occasionally, the male, especially in the breeding season, sets its wings in V-shape and falls through the air, making a sound that has variously been called: boom, boot, booey, buzz, pope, and woof. The latter wording or, better still, hwoof (and a rattling hwoof at that) seems best to me and I have thought that I could imitate it by drawing the stiff feathers of an old-time, dried turkey-wing, crumb-sweeper rapidly across a series of fence pickets. The nighthawk's most common vocal utterance has been rendered in such form as: beard, beedz, beerb, peeck (my favorite), peent, and pisk. It is of interest that two of the folk names of the bird embody representations of both the wing and voice sounds. They are—pork-and-beans, heard in Maine, and pee-auk-zoom, in Louisiana. Knowing these things, we may understand, while we do not agree with, one of the earlier authors in his attempt to explain the bird's dual performance as follows: "A nighthawk comes forth after sundown on calm summer evenings, having a croaking sound, and is invariably accompanied by a smaller bird distinguished by a feeble monotonous chirp."—W. L. M.

Trappers' Lake in White River National Forest, Colorado, in summer, showing the great natural amphitheater formed by the mountain across the lake. The scene was quite different when the author visited the lake and saw spring arrive.

Spring Comes to Trappers' Lake

By LOGAN B. CRAWFORD

U. S. Forest Service Photographs

SPRING had come gently to the Colorado foothills over a period of weeks. The snow had disappeared a little at a time, the water soaking through the slopes or tinkling down tiny creeks with a sound as silvery as the notes of red-winged blackbirds. Even the roar of the river had been only a louder song, growing gradually in our ears and mingled with frog music and meadowlark notes.

But spring came to Trappers' Lake all in a day and a night; in mighty cataclysms with a crash of trumpets and roar of cannons. And there was nobody to see it but me. If I had been a day earlier or a day later, I would have missed it. I had gone to the lake in the Flat Tops that June morning to see if it was time to take native trout spawn for the Steamboat Springs hatchery.

When I left Henry Head, who had driven me as far as the Stillwaters above Yampa, I said, "I'll be back tonight, Henry. You be here to meet me." But I did not get back that night, or for another twenty-four hours. I was a prisoner at Trappers' Lake.

In summer the wild rugged country of the Flat Tops is a fisherman's paradise, for here from deep, clear lakes spring White River, Derby Creek, Sweet Water, the Roaring Fork of the Yampa, and countless other small trout streams. Deer and elk travel the trails through the heavy timber from one grassy park to another, bears wallow in the mud holes, and mountain sheep leap along the high crags.

In winter the place is isolated. Winds whip the snow into fantastic frosting for the great, ten-thousand-foot, white birthday cakes that are the Flat Tops. Some of the frosting never melts the year round.

When I started from the Stillwaters, I carried my skis over my shoulders, for down there it was muddy, grass was growing, and larkspur purpled the hills. As I climbed higher, I ran into snow on the north slopes and in the timber, but it was crusted so hard that I could walk on it. A couple of hours later, when I got "on top," the sun was beginning to melt the crust, and I broke through and had to use my skis. The high country still looked like the dead of winter. The old gray woodchucks that whistled at a fellow in summer were sound asleep under ten- and twenty-foot drifts.

Another view of Trappers' Lake while snow still lingers on the mountains.

Once, on a wind-swept point of rock, I saw a ptarmigan, spotted white and brown, in midseason plumage. Spring must get here some time, I thought.

A warm wind sprang up. The sun, pouring out of a bright blue sky, grew so hot I shed my jacket long before I came to Little Trappers' Lake. From there I slid and plowed my way down a mile or so through the timber to Big Trappers' Lake, reaching there about ten o'clock on that lovely June morning.

Sticking my skis in a snowbank, I stepped upon a strip of bare ground near the tumble-down log cabin some old-timer had built. I breathed a long breath, and just looked. The ice was out of the lake. Calm and deep the water lay, reflecting the great square mountain opposite. The surface was hardly rippled by the breeze. Never before had I felt the stillness so keenly—the thick, furred silence of the forest, the encircling quiet of the scarred white crags. The mountain sheep had had to hunt better pasture; the wild ducks had stopped in lusher ponds; the muskrats and beavers had not begun their summer's work. I did not see even a rabbit.

But there were plenty of trout in the lake. At the inlet from Little Trappers' big speckled beauties, flashing bright underparts, twisted their way into the shallows. I walked as far as I could around the shore, and decided that in another week the boys and I could come and take spawn. Near the outlet, which is the beginning of White River, I scared up a spotted sandpiper, a lone spring arrival. Its plaintive cry hardly made a dent in the monstrous stillness.

In a shady spot on a dry bank near the cabin, I ate the sandwiches I had brought in my pocket and stretched out to rest a while before heading home. The shade kept shifting, and the sun got on me. I remember thinking that sun was as hot as August! I must have been dozing when *Boom!* went the first cannon, followed by a roar like a rampaging river. I lit on my feet, unable to think what was happening. It could not be a cannon away off here in the mountains. It must be thunder, for it sounded just like a summer cloudburst when lightning strikes a tree. But the sky over the lake was a serene, sunny blue, and cloudless.

Boom! This time I saw a chunk of ice as big as a house break from the cliff to the south, starting an avalanche that took rocks and timber with it. Before the echoes could die another slide let loose, shearing off the Engelmann spruces as if they were grass. A red-tailed hawk came screaming out of the vicinity. Immediately, a mile farther along the mountain, came the jar of heavy artillery, answered, away to the east, by a giant charge. I had seen a few slides in my lifetime in the Rockies, but never a dozen at once. All the length of the mountains that sizzling sun, along with the Chinook wind, was hacking off those big, overlopping drifts like a red-hot knife. Where a moment before the valley had lain in winter quiet, it was now filled with the clang and din of battle.

I thought I had better be getting out, too! But when I put on my skis and struck up through the timber, I discovered the snow had become so soft and sticky that I could no more travel than I could fly. I would have to stay at the lake that night, and climb out on the crust in the cool of the morning.

I went back and stood on the shore, feeling very small and helpless—a mere man in the midst of a mighty upheaval of Nature. I was trapped. There was not a thing I could do about it. *Crash!* Another monstrous chunk of ice cracked off the square mountain opposite and a new avalanche rocked the basin. *Crash! Boom!* The distant blasts of breaking ice and the rumble of unseen avalanches told me the same thing was happening for miles around. The old Flat Tops seemed to be shaking their ancient lava bones. Winter was letting loose all holds, and spring was moving in with a tremendous salute.

Wherever a slide plowed a path, a waterfall appeared. Trickles grew rapidly to rivers of white spume. Before my eyes the cliffs were transformed into giant Niagaras as if the scheme of Nature had suddenly been upended, and the valleys had been exalted so that the rivers were now on the mountain tops. Had I been on one of those mountains I would have had good cause to be alarmed, but I knew I was perfectly safe as long as I stayed where I was. Trappers' Lake is six or seven miles around and there was not enough water in the Flat Tops to flood it over its

banks. So I thought! To see how much the water would rise I set a long stake in the edge of the lake, notching it with my knife at the present water level.

By midafternoon torrents were cascading over the cliffs, dashing like ocean spray down the crevices, shattering into rainbows on the talus slopes. There were rainbows—a million of them—in almost any direction I looked. I wished someone else was there to see what I was seeing. Someone who could say, "Yes, that's true!", when I tried to tell about this in the valley. People would think I was exaggerating. I could explain how the unseasonable, smoking hot day, and the particularly heavy load of snow on the cliffs, had combined to produce a spectacle that mortal might never again behold. Words! What I was seeing was a thing to take a man's breath, to rock his very depths.

Stumbling along the shore, my eyes on the display across the lake, I heard a thin high wail, and looked down at the little sandpiper teetering on a rock. "Hello!" I said, glad that he, at least, was still here.

High in the blue the circling red-tailed hawk screamed in outrage. So there were three of us!

Up to the inlet, down to the outlet—a dozen times I made the trip that afternoon, the lonesome sandpiper curveting ahead of me. I could not hear my footsteps in the sand for the tumult about me, although the scream of the hawk pierced everything. A thousand streams blended in one ocean roar. The woods reverberated with it; the sky gave it back, but there was no rhythm to it. And every few minutes came a deafening "explosion." The basin was full of mist. I thought that maybe, when the world was being made, when the land was being separated from the seas, there had been such cataclysmic confusion.

When the shadows fall, this will end, I thought. The melting will stop; the crags will grow quiet; the woods will be at peace again.

I shot a couple of trout for supper. The sound of my gun was puny alongside the cannonading at the cliffs. I cooked the trout on a willow spit and ate them with wood ashes for seasoning.

As the sun went down I looked at my measuring stake and made a new notch. The lake had risen more than a foot!

Any mountain sunset is a thing to fill a man's soul, but what I saw this night was a hundred sunsets rolled into one. I stood in the midst of glory unspeakable while the last long rays from the west flashed red and gold, purple and green, from the streaming cliffs. The waterfalls were like chains of jewels. The whole air was beaded color.

Then night came. The hawk and the sandpiper deserted me, I tried to sleep in the old cabin on a wooden bench because it was dry. *Bang! Crash! Boom!* The thunder of slides and splintering of ice continued—more awesome in the dark. I had never felt more alone in all my life, and I had slept in the wilds many a night, winter and summer. The bench was as hard as a rock. I went outside, made a big fire in the edge of the timber, cut some boughs for a bed, and tried again to sleep. The stars, usually so big and friendly, over and in the lake, seemed a long way off.

Crash! Crack! Roar! I got up and piled more pitch on the fire. The flames flickered back from the restless water. Ordinarily the splash of a beaver would have been the only sound in the deep mountain silence. Now all I could hear was the rending of trees as more slides knifed the forests. I spent a sleepless night.

Near dawn I imagined that the noises subsided. Surely the melting was over for the air had cooled considerably. I hoped the snow would be hard enough to bear my weight on the trail home.

The snow was not hard, but by daylight I had floundered on my skis up to where I could see the "Chinese Wall," lying east of the lake and extending three or four miles north. Sunrise flamed from a solid sheet of water pouring over the great rock rampart. I could not stop to watch it. Struggling on, I came to the first prong of a creek that I had jumped over coming up. It was rolling along, three times its ordinary size. I took off my skis and waded in, but the force of the water knocked my feet from under me and by the time I had scrambled across and rescued my skis a hundred yards down the hill, I was soaking wet. Within a few feet I reached another feeder to Little Trappers' Lake, and this I knew better than to attempt. That angry white water, roaring through the trees where there had never been a river before, was a fearsome sight. Once more I had to turn back. Now, I thought, I would be unable to retrace my steps, for the first stream was enlarging every second. After desperate jockeying I did (Continued on page 218)

A Spring Walk

By LINDA WHITAKER BROWNE

We marked the sandstone fragments, white as chalk,
The new road tracing through the tangled wood,
We climbed the briary slopes as best we could,
And sat beneath the beech to rest and talk;
Leaving the pearled arbutus on its stalk,
And downy liverwort, and ferns that stood
Green mid the brown leaves—saw that they were good,
Yet brought this sonnet only from our walk.

Am I grown older merely, or more wise?
Where now is girlhood's grasping, eager hand?
No more I look on life with greedy eyes,
Or seek Elysiums through an April land,
Or hope to find, on any earthy strand,
The nation-healing trees of Paradise.

Nomads under the North Pacific

By ROBERT HERTZLER

A young cat is posed atop a king crab to give an idea of its size.

FROM somewhere in the murky darkness forty fathoms down in the cold waters of the Gulf of Alaska a vague hint of danger registers on the dull perceptivity of a starfish feasting on clam-flesh. Obedient to a nameless fear, the starfish relaxes its five-armed embrace, abandoning a meal obtained only after hours of patient straining, and moves reluctantly towards a hollow several yards distant.

But, before the cautious echinoderm can reach safety, the enemy appears in the form of a giant crab, orange-gray in color, and mottled with barnacles and clusters of moss. Tip-toeing along like an agile tumbleweed on six walking-legs that measure more than two feet from the oval carapace to their slipper-shaped points, the huge crustacean advances in sporadic, helter-skelter rushes. The starfish resorts to its last defense and becomes a lump on the mud bottom.

Guiding itself by smell rather than sight, the crab quickly locates the clam and prepares the morsel for eating. First it cracks off bits from the sprung shell with savage chops of its powerful right claw, and eventually, although quite by accident, works both hooks into the opening. One wrench, and the clam lies open. The old, barnacle-covered monarch begins to eat hurriedly as other crabs close in from all sides.

What might have been a battle soon turns into a co-operative chase as the starfish attempts a sluggish break for freedom. The spidery shapes dance forward to dart rapier thrusts at the new quarry, and after a few scissoring slashes have found their marks the victim is dismembered. Seconds later, the last scrap is devoured, and the crabs move off in spasmodic marching cadence, a military movement under sea.

Paralithodes camtschaticus tilesius is the commonest of three species of giant crustaceans that range over 12,000 square miles of the North Pacific and Bering Sea bottoms in foraging, far-wandering armies. One of Nature's most grotesque undersea creatures, the Alaskan king crab, as it is popularly known, has managed to adapt itself to a rigorous environment in which food scarcity necessitates constant mobility.

Some of the creature's deepsea wanderings have been charted. Male crabs tagged in the spring of 1941, by biologists accompanying the Fish and Wildlife Service king crab investigation of that year, were recaptured in the autumn as much as 300 miles away—as the crow flies, but not as the crab travels. Observers, noting that king crabs in shallow inlets meander like bird dogs coursing a field, estimate that they actually cover ten to fifteen times more ground than a straight-line distance would indicate.

One crab, taken from waters twenty fathoms deep, was tagged, released, and picked up 113 days later sixty-one miles away at forty-five fathoms. Another wandered a circuitous route that ended in a fisherman's crab trawl fourteen miles and four months away. The vertical migration, however, was sixty-eight fathoms—from twelve down to eighty. Japanese fishermen have reported catching very large crabs, measuring more than six feet in leg span, almost a fifth of a mile down at 200 fathoms.

Tagging operations conducted by the Japanese Imperial Fisheries from 1927 to 1932 showed that the male crab covers an average of about two miles per day. The best individual performance for the males

A member of the crew of the trawler *Deepsea* inspects a king crab.

was 7.09 miles per day, in a direct line, over a period of two weeks. The speediest of the smaller, less energetic females made a maximum of 5.6 miles per day.

In addition to the constant search for food, the mobile crab population participates in two major migrations during the year. These take place before and after the mating season. On the Alaska side of the North Pacific and Bering Sea, shoals of female crabs start moving from the deeps to the inshore waters at the beginning of the moulting season in late March and April. In the northern part of the crab's range the spring migrations occur later than in the south, but in all parts of the king crab's domain the male crabs appear on the moulting-mating grounds about two weeks after the females.

This mass movement to waters ranging in depth from five to twenty fathoms is Nature's way of protecting both the newly moulted adults and the fresh-laid eggs from the pressures and near-freezing temperatures of the deeps. The second big migration is the trip back to the sea floor, in late June, led by the male shoals.

Once the bay and inlets along the Alaska coast and its offshore islands are reached, an elaborate and unusual courtship is begun by the male crabs. The wooing of the females is a stylized and formal routine opened with a dance of sorts, executed by the bachelor crabs in varying rhythms on their six segmented legs. If this feat attracts the attention of one of the female crabs, the dancer is rewarded with a "handshake", which is the second preliminary to actual mating.

Before the "handshaking" the male must first spar for an opportunity to come to grips with the female, who usually responds by coyly parrying his advances. This flirtation is carried on face to face, and ends with the male fastening his claws on the forward part of the female's shell, following which she becomes completely submissive.

At this point it might be said that the pair has become engaged.

The male crab makes public announcement of the pending union by carrying his betrothed about in a face-to-face, horizontal position for from three to seven days, during which no food is taken. Mating takes place after the female has moulted. The unwooed female moults alone, but one that has been courted and won sheds her shell while held firmly by the male crab. This enables her to back out of last year's exoskeleton with a minimum of effort. The male carries the empty shell about for a few moments until he realizes it is empty, and then quickly reclaims the female.

During the mating process the female opens her abdominal pouch to receive the eggs, issuing from her oviducts, and the male's strings of spermatic cells, which are washed into the opening by a current of water generated by the male's swimmerets. The fertilized eggs adhere to the hairs lining the female's pouch.

One of the remarkable characteristics of the king crab's reproductive process is that the female is incubating fertilized eggs in her abdominal "nursery" at the same time eggs are being produced in the reproductive tubes for the next year's hatch. Little wonder that the female of the species is smaller and less active!

After fertilization, the 150,000 to 400,000 eggs in the individual female's pouch resemble tiny bunches of grapes, each egg being about the size of a pinhead and deep purple in color. While within the egg, the organism advances from the nauplius, or primary state, to the zoea form. Following this metamorphosis, which takes place between 100 and 110 days after fertilization, the embryo crab has become a black-eyed, segmented larva, equipped with legs and supplied with nourishment from a yoke still larger than itself. These larvae are carried by the female for another eight months before hatching at the end of the fifty-week gestation period. The several hundred thousand

eggs hatch in about five days once the egg cases begin to break.

Within ninety days after hatching the organism moults five times and passes through a second larval stage. After the fifth moult, which is reached by 3.58 percent of the original hatch, the grotesque, whiskered larvae become tiny but perfect crabs. While the adult crab may attain a span of more than six feet, these first replicas in miniature would fit nicely on the eraser of a lead pencil, with legs fully extended. At this stage the crab feeds largely on diatoms and eel grass.

Before reaching biological maturity, nine or ten years later, the crab progresses through as many as thirty-eight moults. American biologists place the life span of the king crab at between twelve and fifteen years, but the Japanese say it is closer to twenty-five years.

Mature females moult annually during the months of April and May, but the larger males are believed to shed their shells with less regularity.

The moult is thought to occur mainly at night, and probably takes about ten minutes for the smaller crabs. After crawling out of the old shell, which is split around the back of the carapace by absorbed fluids, the crabs are stripped of every scrap of hard material on their bodies. The entire exoskeleton, gills, eye covering, antennae, lining of the mouth, esophagus, stomach and a portion of the intestine, are all dropped in the shedding process.

This little blonde has an interesting and different companion.

The denuded crabs are able to walk immediately after moulting, but the muscles of their legs have been reduced to wobbly, almost uncontrollable masses of tissue. Their helplessness is increased because of the loss of sensory perception suffered by the eyes and antennae. Feeding does not begin until three or four days later, and partial recalcification is completed over vital areas after about ten days. Until full armor is restored, the crabs are easy prey for their natural enemies, and their remains are often found in the bellies of halibuts, cods and sculpins. Even greater destruction is wrought by the fast-moving otter trawls, or scoop nets, used by commercial fishermen in harvesting the crabs. Almost all the newly moulted crabs entangled in the nets are killed outright, and their flesh is useless for canning or freezing.

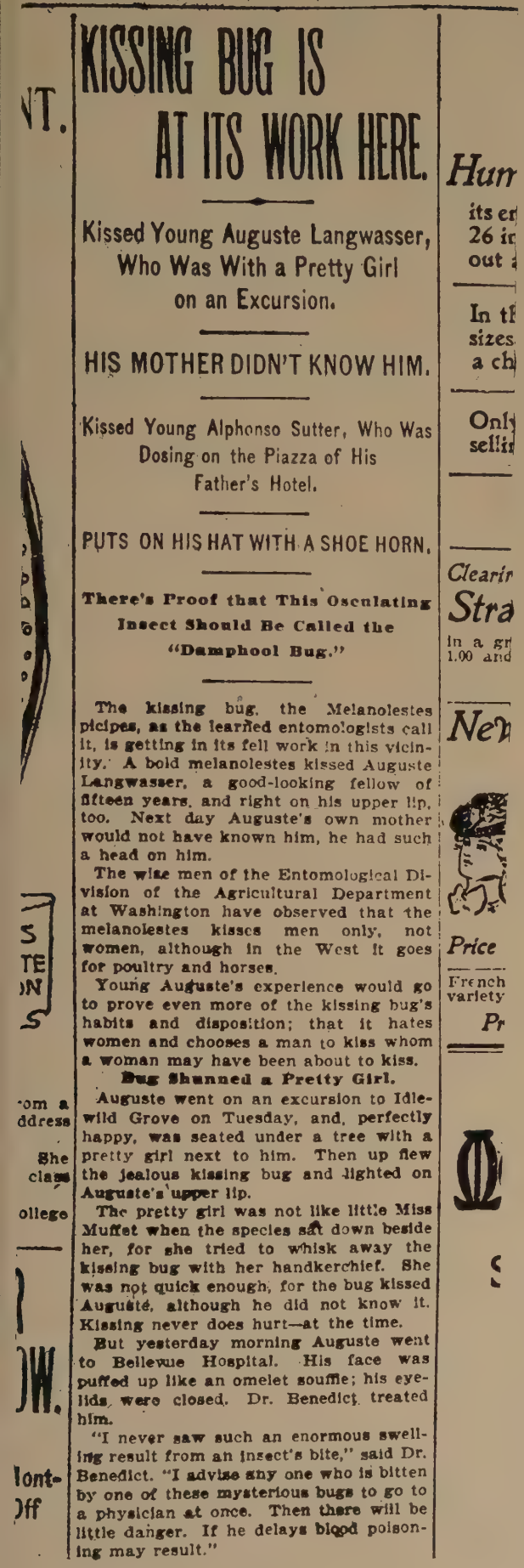
Upon attaining biological maturity the crabs of both sexes increase in size two to five percent with each annual moult until a limit, which is governed by environment, is reached. Uniformity of size is the rule in crab shoals, although the average measurements vary greatly between the northern and southern parts of their range. In the Bering Sea area of the monarch's domain, which extends as far as Nome, Alaska, where they are caught through holes in the ice in midwinter, they rarely exceed fourteen pounds in weight. The spread of the males averages about three feet.

But along the Gulf of Alaska crab beds, the rulers of the muddy bottoms reach truly astounding proportions. Weighing as much as twenty-six pounds, monsters measuring over six feet from the tip of one walking-leg to the other have been caught. The average for the males of this area is about fifteen pounds in weight, and four feet in leg span.

In their ocean environment the crabs show a tendency to gather together in tremendous shoals. One such scavenger army, observed off Kodiak Island in 1940, was estimated to comprise more than 12,000 crabs, in an area equal to three city blocks. These shoals travel along, eating dead fish, sea cucumbers, starfish, mollusks and some of the vegetal matter in their path. They favor sticky mud bottoms, or mixtures of sand, mud and broken sea shells.

Since about one-fourth of the mature crab's weight is edible meat of a very high quality, the king crab is rapidly becoming a product much sought after by commercial fishermen. Several Pacific Coast fishing concerns are producing both canned and frozen crab, which is being retailed on a limited market for the first time since the war interrupted the even course of the crab fishing, and put this oceanic delicacy on the list of items hard to find on grocers' shelves.

Efficiently exploited since 1892 by the Japanese, our offshore king crab beds did not come under the surveillance of the government until 1940, when Congress approved a special appropriation to explore the North Pacific ocean floor and work out methods of canning the crabs in commercial quantities. Previous to that time, between 1931 and 1940, the Japanese, using floating canneries, had supplied us with seventy-eight percent of the crab meat consumed in the United States, at a revenue to them of $3,000,000 per year.



HURSDAY, JUNE 29, 1899.

KISSING BUG IS AT ITS WORK HERE.

Kissed Young Auguste Langwasser, Who Was With a Pretty Girl on an Excursion.

HIS MOTHER DIDN'T KNOW HIM.

Kissed Young Alphonso Sutter, Who Was Dosing on the Piazza of His Father's Hotel.

PUTS ON HIS HAT WITH A SHOE HORN.

There's Proof that This Osculating Insect Should Be Called the "Damphool Bug."

The kissing bug, the Melanolestes picipes, as the learned entomologists call it, is getting in its fell work in this vicinity. A bold melanolestes kissed Auguste Langwasser, a good-looking fellow of fifteen years, and right on his upper lip, too. Next day Auguste's own mother would not have known him, he had such a head on him.

The wise men of the Entomological Division of the Agricultural Department at Washington have observed that the melanolestes kisses men only, not women, although in the West it goes for poultry and horses.

Young Auguste's experience would go to prove even more of the kissing bug's habits and disposition; that it hates women and chooses a man to kiss whom a woman may have been about to kiss.

Bug Shunned a Pretty Girl.

Auguste went on an excursion to Idlewild Grove on Tuesday, and, perfectly happy, was seated under a tree with a pretty girl next to him. Then up flew the jealous kissing bug and lighted on Auguste's upper lip.

The pretty girl was not like little Miss Muffet when the species sat down beside her, for she tried to whisk away the kissing bug with her handkerchief. She was not quick enough, for the bug kissed Auguste, although he did not know it. Kissing never does hurt—at the time.

But yesterday morning Auguste went to Bellevue Hospital. His face was puffed up like an omelet souffle; his eyelids were closed. Dr. Benedict treated him.

"I never saw such an enormous swelling result from an insect's bite," said Dr. Benedict. "I advise any one who is bitten by one of these mysterious bugs to go to a physician at once. Then there will be little danger. If he delays blood poisoning may result."

Two insect contributors to the "kissing bug" scare of 1899. At the right is the masked hunter, or *Reduvius personatus*, one of the assassin bugs that was involved. Below, the wheel bug, *Arilus cristatus*, another insect that caused headlines. At the left, the headlines themselves as published in the *New York World*, causing excitement similar to that aroused by the "flying discs" of the summer of 1947.

When It Hurt to Be "Kissed"

By NORMAN L. MILLER

IT IS a far cry from a "flying disc" to a "kissing bug," but just as the former captured headline space in newspapers throughout the country in the summer of 1947, so did the latter during a similar season in 1899.

The "kissing bug" scare got off to a flying start when hospitals and doctors reported treating painfully stung victims, most of whom swelled up like poisoned pups.

The old *New York World* carried a story of a young man, out courting his girl, who, instead of being kissed by the young lady, was "kissed" by the bug. The next morning the youth reported to Bellevue Hospital for treatment, his face puffed up like an omelet souffle, his eyelids closed.

"I never saw such an enormous swelling result from an insect's bite," the attending physician reported, "I advise anyone who is bitten by one of these mysterious bugs to go to a physician at once. If he delays, blood poisoning may result."

Similar stories came to public attention, and it was not long before the "kissing bug" was on the lips of every man, woman and child, literally or otherwise, for all reports stressed the bug's preference for this part of the human anatomy.

The "kissing bug" was so thoroughly sensationalized that the expression is carried down to present generations, despite the fact that its meaning today may be entirely obscured.

Few newspapers identified the insect, most of the journals

being content to bestow will-o'-the-wisp characteristics upon it. It remained for the *World* to have Department of Agriculture entomologists identify specimens to be *Melanolestes picipes* and *Reduvius personatus*, two members of the large and important family of Reduviidae, comprising more than 2000 species. The one hundred inhabiting this country are generally known as assassin bugs.

These insects are of considerable size. Predacious, they live on the blood of other insects, attacking the higher animals when aroused, and inflicting painful bites on man.

These two species, along with *Arilus cristatus*, commonly called the wheel-bug because of the cogwheel-like crest on the prothorax, found from New York City southward, and as far west as Texas and New Mexico, and *Rasahus bonotatus*, of western habitat, are also regarded as severe biters.

The preponderance of these insects during the summer of 1899 was undoubtedly due to infestations of bed-bugs, considered choice morsels by the Reduviidae clan. The latter can usually be found in dirty houses where they prey upon bed-bugs and cockroaches, hence are beneficial, although some of the species have been known to transmit dread Chagas disease.

In Java a particularly resourceful "kissing bug," *Ptilocerus ochraceus*, is known to frequent the runways of ants, enticing the latter to peculiar glandular hairs, which the ant "milks." Within a short time the ant becomes paralyzed, is seized by the murderous bug, which inserts its beak and sucks the ant dry. Entomologists have reported seeing the floor beneath the assassin bugs' position littered with dead ants.

Despite the hubbub created by the "flying disc" tales no casualties were reported, but the "kissing bug" left a long trail of victims in its wake, aided and abetted by newspapers of the land. It ranks as one of the big "scare" stories of its time.

"Osculation" in 1899 was not without peril!

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Why Are Our Wild Animals?

By SAMUEL A. HARPER

WE ARE all slaves of words. We go along year after year using a word in the same old way, and frequently after it has ceased to have the meaning it was created to convey. We also have the lazy habit of using a word because it has been used before to the same purpose, whether it was ever exactly suitable for that purpose or not.

"Wild," as applied to free, undomesticated animals, is one of these words. It is not applicable to these animals now, and, properly speaking, it never has been. In other words, the animals referred to are not wild—*we merely call them wild.*

A few days ago, as I was seated on this terrace where I now write, I noticed a robin and a brown thrasher moving about in the grass, feeding, each in his own characteristic manner. A few feet beyond, at the edge of the lawn where the woods came up, a rabbit was quietly stuttering his nose in the grass. These three animals were entirely friendly and peaceful in their respective attitudes toward each other. Doubtless no one of them regarded the others as "wild" animals. There were no apparent restraints or signs of uneasiness among them. But the moment *I* arose from my chair and started down toward these animals all of them hastily disappeared. This did not prove that they were "wild." *It merely proved that they were afraid of me!* And the humiliating fact struck home that man's attitude and conduct toward his brother animals on the planet had resulted in universal fear of him. We know that in some instances and at certain periods some animals prey upon others. Such predators are naturally feared by those they prey upon. But most animals live together in comparative peace and concord. In any case, they, unlike man, only kill for food and in defense of self and young. Man alone kills for lust—including, alas, millions of his own kind year after year—and he is the only animal that is *universally* feared by all other animals. This fact constitutes a terrific indictment of man's life with his brothers here on earth. Their common and invariable attitude toward him tells, plainer than any words that could be uttered, what man has done to his fellow creatures. To call these animals "wild" because they fear us is a misuse of the word designed to cover up our misuse of them.

In the old, pre-scientific days man was generally regarded as a being definitely set apart from the rest of the earth's living things. He was one thing and Nature was another and different thing. Now we recognize the fact that man and Nature are one, not two. All the animals on our planet constitute one large family, and man is definitely related to all of them. Nature is unconcerned with his nomenclature—his divisions and classifications. These are all mere words, used to feed his vanity.

And man should not be excused for calling these animals "wild" merely because they universally exhibit fear of him. He should face the humiliating fact that their "wildness" is the direct result of his age-long cruelty to them, and resolve that his future attitude toward his fellow creatures should be one of consideration and respect, as of one personality for another—to the end that the care and conservation of *all* animal life would be but a natural and inevitable thing in a world where man behaved properly.

A Tropical Idyl

By THIERRY WATSON

Illustration by Jackson Miles Abbott

"ALFIE" was the name we gave to a strange and bristly little animal we found in our tropical garden on the outskirts of the jungle, on the border of the Cordillera Merida, in northwestern Venezuela. This was our name for a friend back in the States, a benign although very dignified surgeon, and it came to mind as we noted the comportment of our new guest. Dr. Alfie, we were sure, would be pleased at our remembrance of him.

We were equally certain that our surgeon friend would be more than a little nettled at the suggestion of a resemblance between himself and an animal that the natives called *cochino* —Spanish for pig. It was plain, however, that our pet was a rodent, and a relative of the guinea pig. The *cochino,* according to Miguel, our house-boy, inhabited the jungles all about the region.

Alfie would tug persistently at the Sunday papers until he had extracted the comic section, because bright colors fascinated him.

That Alfie had a strong human likeness of feature was promptly observed by our old native cook, who, as soon as she saw the little fellow, exclaimed to her daughter, "Felipe Lopez!" She explained to us, with a tongue-in-cheek expression, that Alfie resembled someone she had known. In the days to come either Alfie or Felipe was apparently equally acceptable to our guest.

This animal, Miguel explained to us, was meat for the gods—or such was the implication from the rolling of his eyes and rubbing of his own fat little belly. Later we were to learn, at other tables, that it was indeed a succulent roast, unequalled even by the real suckling pigs of our own country.

Miguel contrived a little pen, but after a few days the gentle little animal so endeared himself to us that the mere thought of eating him was intolerable. Thus he became a permanent member of our small animal family, originally acquired for gustatory enjoyment, but spared because of individual characteristics.

Our new pet greatly resembled a small rabbit, minus big ears and tail. His rough, auburn fur was streaked with white, and enormous bristly whiskers adorned his mouth.

Miguel, proud to impart native lore, told us Alfie's kind were night prowlers, sleeping days, roaming nights in search of their plant food. Since he was not to be fattened, he said, we must liberate the little animal, as he would always return if we provided a little lair to which he could come, and which he could leave at will.

Our new pet remained contentedly with us, rapidly becoming domesticated, responding to our attentions much like a companionable puppy. During the day he slept. When we visited him toward evening our calls were answered by contented little grunts. Then Alfie would emerge, stretching sleepily. Sometimes he sauntered out voluntarily, joining in our evening promenade.

Bright colors fascinated Alfie. Colored comic sections of the Sunday papers delighted him. He would tug persistently at a bundle of papers until he extracted the gayly colored sheets. Then off to his nest he would trot, a ludicrous sight, dragging his prize behind him.

Thus many pleasant months passed, while Alfie lived two lives. The domestic one was with us; his natural one at night in the jungle. We never followed him, content to have his trust and apparent affection, and pleased he remained so willingly with us. Then there came an unanticipated morning when he failed to come back.

We were disconsolate, feeling that nothing short of capture would prevent our loyal pet's return. No one in the community would harm him. He was known to be our pet. He was known, too, because of his resemblance to Felipe Lopez, who, it transpired, had been a local "character" in the native village.

Day followed day of unrewarded waiting, as search in the vicinity and far afield proved fruitless. Miguel shared our sadness, but with the primitive stoicism with which he accepted all realities of life. He told us what we should have known, that Alfie had reached maturity; that henceforward he would live in the jungle with his mate.

The disappearance of our droll pet left a keen sense of loss, but miraculously, it seemed to us, we saw him once again. About a year after his disappearance, as we sat, one dark, tropical night, on the front veranda of our new home some distance from the previous one, he suddenly returned.

First we heard the familiar clump, clump of little animal feet on the back veranda steps; a silence; then a quick scamper through (Continued on page 218)

Keeping a Tadpole-Arium

By PEGGY MOWERY

Illustrated by Romeo Mansueti

". . . little herd of filmy-tailed tadpoles drifting up and down in the bowl, and by the congregation of tiny green frogs sitting around on the small wood rafts."

SEVERAL years ago a scientist friend of ours in the city asked us to collect him some tadpoles, which he wanted for an experiment. When he came after them a few days later, we had got so interested in our kindergarten froglets that we made him go out and catch his own.

Since that accidental discovery of how fascinating a "tadpole-arium" is, we have kept one the year around. It is the first thing that little people head for when they visit us. Grown-ups, also, never fail to be intrigued by our little herd of filmy-tailed tadpoles drifting up and down in the bowl, and by the congregation of tiny green frogs sitting around on the small wood rafts.

A tadpole-arium is made by the simple process of half filling a fair-sized fish bowl, or any sort of glass jar holding a gallon or more, with water. Any chlorine in the tapwater can be removed by pouring the water from one pan to another several times.

It is the most fun to start with frog eggs. When the warm March days in the North melt the ice, the first spring peepers come out of their winter retreats around the ponds and begin piping it up among the green marshferns and purple trilliums at the water's edge. Then the bigger frogs emerge, and the early-April nights are filled with frog choruses ranging from a shrill "*knee dee-eep*" to a rumbling bass "*better go r-r-round.*"

By mid-April you can find frog eggs in almost any pond or roadside marsh. They look like a cup-sized mass of black dots in a jelly-like cluster, with roughly a hundred eggs per cluster. They may be collected from the last of March to the first of June. Frogs fasten their eggs to reeds and grasses near the surface, whereas toads lay their eggs in two long, gelatinous ribbons, which sink to the bottom of the chosen spot.

With a piece of mosquito netting, or even your bare hand, dip out one of these clusters and put it in a wet handkerchief to take home. Frog eggs stand pretty rough treatment; a little jostling or being out of water for half an hour does no harm. While you are at the pond, gather a few sprigs of water plants, such as eel grass, duckweed or water milfoil, to keep your tadpole-arium sweet.

In the warmth and security of the tadpole-arium, the frog eggs rapidly get bigger and darker, and, in about a week, they start hatching. The eggs on the outside hatch first, and then the rest of the mob come wiggling out through the vitelline mass. Newly hatched tadpoles are about one-half inch long.

If you cannot get frog eggs, small tadpoles will do well. Bring them home as you do the eggs. Tadpoles of the spring-peeper species mature in a few weeks. but those of bullfrogs take as long as two years.

Feeding tadpoles also is simple. Merely sprinkle yellow cornmeal on the water. When the cornmeal sinks to the bottom, they go after it hungrily, and it is quite a sight to watch a hundred of them standing on their heads gobbling up cornmeal at the bottom of the tadpole-arium. After they are several days old, they usually eat the cornmeal at the surface of the water, before it sinks. With mouths open, they swim around in circles and figure eights, reminding one of dancers turning, circling and bumping into one another on a crowded ballroom floor.

This cornmeal and a change of water every couple of days are all the care a tadpole-arium needs.

The tadpoles of most species grow quickly, their bodies becoming sleek and plump, their tails long and filmy. Then, one morning, you will notice that two or three of the biggest ones have a different look. Their heads, formerly soft and (Continued on page 220)

Wazee, Ranch Moose

By GRACE E. RAY

Photographs by Jules Werness

★

Wazee, pet baby moose at Nine Quarter-Circle Ranch, accepts a candy bar from an attractive guest, Mary Afflick of the Chicago *Tribune* radio station.

★

A MOOSE is moody, but reminds one of an elephant in intelligence and love of human beings. Like an elephant, a mature moose may grow fierce when wronged, and even senses unexpected fear and distrust in man. A baby moose is mischievous, but has great capacity for giving and inspiring human devotion—and thereby hangs a tale that finally led to mourning at Nine Quarter-Circle Ranch inside Gallatin National Forest, Gallatin Gateway, Montana.

Wazee was not a little colt. She was a tiny moose, but this made no difference to the palomino mare, Trixy. How and where the adoption took place is a mystery of forest and mountain. The first news of it came when Howard Kelsey, co-owner of the ranch, saw his four-year-old filly stroll into the corral, on a May afternoon in 1946, with this odd-looking baby in tow. Some of the other horses walked along with them, as if this were an every-day occurrence.

Howard supposed the mare had run across the orphan somewhere on the vast range. The fact that Mother Moose was not in evidence seemed to prove that she was dead. Perhaps a hungry bear, a coyote or mountain lion had attacked her while she was giving birth.

Accustomed to barnyard blessed events, Howard estimated that the baby was no more than a day old. He saw the problem Nature presented. Trixy had mother love, but no milk; had never even been bred. Howard knew that if he did not take the little moose away from the herd it might get injured, because every horse ranch has a variety of tough customers in its corral. They may be gentle under the saddle, yet play rough when horsing around among themselves. Certainly this was no place for a moose baby.

He offered the wild baby some warm milk from a bottle with a colt's nipple. She instinctively started to feed, and Howard led her into the barn and closed the door. Trixy was left outside, because she had to be free to roam and eat budding grass. Soon Trixy began to lose her appetite. She would not go away to graze with the other horses. For several weeks she showed distress and kept almost day-and-night vigil outside the stall of her homely, adopted baby.

Wazee took her bottle regularly and reacted to humans by making moaning sounds in monotone similar to puppy whine. She would continue her moaning until her human callers left. Wild female elk have been reported to make sounds similar to a dog's whine or low bark.

After two months in the barn, Wazee was given freedom of the ranch. There were summer guests in the sleeping cabins. She formed attachments for individual guests, and appeared to recognize her personal friends. She would watch all cars driving into the ranch, and when strangers stopped with children she would trot out, greet them and cut a caper.

Wazee showed a preference for children; she had more in common with them. They would romp with her. She liked the butting game. When a child would approach on all-fours, Wazee would obligingly put her head against the child's and push. Wazee tagged young fishermen like a dog, as they angled in Taylor's Fork, in front of the ranch.

At the end of five months the orphan was weaned and put on a diet of hay, with some oats—and all the chocolate bars she could wangle. If she heard Howard rattle a paper she would come running, as she had learned that candy bars came in paper. She was re-

Wazee, at the age of about four months, browses for herself in back of the ranch buildings.

sourceful when hay-hungry, as she would leap through the window of the horse-barn, land in the manger and help herself.

Wazee believed in the open-door policy. She would enter any door that was open, whether bathroom, bedroom, kitchen, or dining room. When the ranch held a dance she would attend, lying in the middle of the floor chewing her cud and enjoying the music, while dancers stepped around her.

Wazee liked people, but her play seemed a bit rough to some. A few who showed fear were mischievously "treed" on top of a wagon, corral fence, or whatever was handy. If they had simply biffed her on her bulbous nose, she would have gone away and tended to her own business.

Although she was still a calf when hunting season approached, Howard knew that some hunters get buck fever, so he made a red cape for Wazee and tied a cow bell on her halter. She seemed to know she would be safe where people went in numbers, so she stayed near buildings. She would appear at the corral at dawn to watch hunters mount and ride away, and would greet them on their return.

In February, 1947, at the age of nine months, Wazee weighed about 350 pounds. She was sleek and ate her fodder with gusto. She would browse off willow and tender pine boughs. Howard and his staff had great hopes for Wazee. Perhaps after she grew up she would present them with a cuddly calf that would be a miniature reproduction of herself. But, in June, 1947, Wazee wandered away. Howard was not worried at first; he thought she had gone for a summer holiday in the mountains, as is the custom of moose in Montana and Wyoming. He knew that wherever moose are befriended, they visit cattle and horse ranches in winter and pick up a few wisps of hay. Of course, they leave in spring to browse in marshes, and they are smart enough not to stick their noses around a ranch until the hunting season is over.

Howard hoped that by January 1, 1948, Wazee would return, but she had brought no New Year greeting.

"I can't imagine where Wazee is," Kelsey said. "It is my guess she is not living—probably met up with some hunter. I'm sure if she were alive she'd be here now."

Howard wants Wazee, although he admits he is a bit doubtful since he read about a Montana farmer who had a pet male moose that lost his temper and attacked a man with its saw-like horns. The man filed suit for $20,000, which would make a pet moose expensive.

Rough Weather Bird

By ETHELYN MILLER HARTWICH

Bluejay, bright darting through the western air,
A shot of blue seen bold through leaden skies,
With uncaught breath you streak, with dauntless speed,
And scream from pine to pine your challenge-cries.

Thrusting through the blizzard's fury gale
Still bearing summer on your plunging wings
You pause for courage at your outlook tree,
Heart-armored by rough weather when it stings.

Full tilt—a-wing—an acorn in your beak
You hail the sleet where howling north winds go;
Brave meteor bird! You give us to believe
You see the crocus bulbs beneath the snow.

The Family Flower Garden

By E. LAURENCE PALMER
Illustrated by Mary E. Eaton

This is the forty-ninth in NATURE MAGAZINE'S *series of educational inserts*

POPPY

CALIFORNIA POPPY

PANSY

PINKS

BLEEDING HEART

SWEET PEA

SUMMER CYPRESS

DAFFODIL

ALONG about the time I stop listening for the tinkle of the sleighbells on Santa Claus's reindeers, a new sound comes to me in the middle of the night. In the woods across from my home, a great horned owl begins calling, and I know that the new year is under way. I also know that, while I may be able to go through the rest of the winter without a cold, there is little chance that I will escape a disease that hits our house as inevitably in January as does the call of that great horned owl.

When the mailman has recovered from delivering the New Year's greetings that came from friends to whom we had sent Christmas greetings, he is certain to bring us some literature as gaudy as the wrappings around our Christmas packages. Some evening my wife and I will sit down to the job of going over these wonderful seed catalogs, and, if the income tax returns have not been too discouraging, some seed firm gets a surprise order. Our usual custom is to order the standard seeds for the vegetable garden, and a few packages for the flower garden. Then, for good measure, we take a flier on something that has a beautiful description and a specially intriguing picture.

While we are waiting for the seeds to come, we may make plans for starting some of them in seed boxes, indoors. This may progress to the point of hunting up some old flats, even to the point of filling them with soil and getting them ready to receive the seeds. We may even plant some seeds and get them well and properly watered. But there have been times when our good intentions were wrecked, and we kept putting off what we had in mind only to find the snow gone and dandelions in bloom. And the seeds we bought have been still in their packages in the kitchen drawer, where we put them after the postman had done his part.

Whether or not we actually plant our seeds in boxes and get young plants for our garden seems to make little difference. Just as sales resistance melted before the blazing color of the seed catalog, so it vanishes when the grocery or dime store blossoms some day with crowded flats of pansies, petunias and sweet alyssum. We might just as well have saved ourselves the time and effort of raising our own little plants because we are sure to buy a good supply when they first appear at the roadside stands, or in the stores we visit as the season progresses. Still, there is fun in raising things yourself, fun in talking over your plans with the family and with others, and I have never seen the time when we had too many garden flowers to satisfy all of the family.

Some six years ago, I wrote a unit of this series about the flowers that I have in my garden in the fall. Earlier, I had written about the little patches of attractive weeds that I had to protect from the predatory instincts of the rest of the family. In an off-guard moment, I offered to share my surplus mallow seeds with those who shared my interests, and, for two years, at least, correspondents exhausted my supply. Within the year, I have had inquiries from readers who wanted to know if I still had any of those seeds left.

One man wrote that his wife would not let him rest until he had written me and got some seeds for their garden. This touched a sensitive spot because I am quite sure that gardening in any of its aspects is best undertaken as a family project. This means that, while some may do the yeoman work of spading and pulling the weeds and transplanting the heavy stuff, others may follow up with the touch of the artist here and there, or pass the ultimate judgment as to whether a flower should be picked or left in its native glory on the plant. This division of labor and responsibility makes each one feel that he has his part in the garden, and this is, to me, what a flower garden is for. Of course, there are times when experience must provide authority for certain arbitrary decisions. For example, the younger members of the family may be anxious to give their efforts to the success of the garden, but they do not know what the first leaves of an oriental poppy may look like. Left to themselves, a garden might have an extremely limited variety of offerings, so there are times when authority has to step in and lay down the law. True, one can provide opportunity for the expenditure of endless energy by allocation of portions of a garden to different members of the family. However, that always seems like breaking up the family too much. If we break up the garden, we might as well break up the living quarters of the home. If we do that too arbitrarily, we might as well break up the home. No; the whole family should have some part, some responsibility, and some pride in the family flower garden, and the contribution of each should be recognized from the time the seeds are bought, through the spading of the soil and the pulling of the weeds, to the harvest of the flowers.

As was the case with the fall garden, about which we wrote earlier, there are always decisions to be made regarding the relative merit of hardy perennials and of susceptible annuals. If perennials are to be grown, it is usually best to have some map of the area showing where a rare lily is grown, or where we may expect a bleeding heart or columbine to show their pretty heads later. Without such a plan, the spading and hoeing incident to the care of any garden may unwittingly eliminate the most attractive factors.

COLUMBINE

IRIS

NASTURTIUM

TIGER LILY

Adequate planning of a flower garden is a long-time process. It calls for an understanding of the effect of associating different colors. It demands knowledge of the flowering time of the various plants represented. It calls for information on the length of the season in the different parts of the garden, and for an appreciation of the need for sun and shade and water incident to the prosperity of the species to be grown. Long-time planning also means that we must know what other animals besides ourselves recognize our garden plot as a legitimate hunting ground. If we want a few chipmunks scampering over an adjacent stone wall, we may have to agree to do without some of our crocus bulbs, or arrange to cover them with coarse, galvanized wire through which the chipmunks cannot burrow, but through which the crocuses may readily thrust their early flowers.

While most of us like to trade plants with our neighbors from near and far, we must remember that trading plants may be as calamitous as trading handkerchiefs. We used to have a wonderful display of irises that was our pride and joy. Then, one summer, we added considerably to our supply by trade with our friends and by purchase from a number of sources, and, I am ashamed to say, by doing a little scavenger work on a waste heap near the university flower gardens. Somewhere along the line we made a mistake, or, somehow, our expansion plans did not meet the approval of the gods of all good flower gardens. At any rate, our iris plantation shrunk rather than expanded, and we finally found that the trouble was due to a borer that up to that time had never given us any trouble. From this, it may be seen that at times it may be best to leave well-enough alone. Do not tempt fate too much. If you have a good established growth of a favorite species, do not expose it to attack by introducing something that may be infected with an insect or fungal pest you are not able to recognize. Some of you may remember your grandmother's flower garden that was lush with plants of which she was justly proud, because they had been with her through the

TULIP

PETUNIA

SPIDERWORT

GARDEN PRIMROSE

thick and the thin of a long and happy life. If you have a garden like that, it is almost sacrilege to try to jazz it up with the introduction of new plants.

When I was a youngster, one of these old established gardens was maintained by a family next door. In the midst of it was a rain-barrel that always was crowded with mosquito larvae and in which we youngsters used to like to dunk the leaves of nearby bleeding heart to see how silvery they appeared under water. We also used to pull the flowers of bleeding heart apart to find the outer "red rabbits" on down to the slender green "vase" in the center. The old folks in those days had time to show us these things about their favorite flowers. Somebody showed me the little man in the center of a pansy flower whose shrugged shoulders dusted pollen on visiting insects. Others showed us the "salt shakers" that developed from the center of a flaming poppy, pointed out the slime that comes from a broken hyacinth stem, and taught us to nibble nasturtium leaves, seeds and flower-spurs. These homely things about our common garden flowers we rarely find mentioned in the books of today, and yet they bred a familiarity between me and my flowers that I never could get in a modern elementary science class. I would not like to go through life without knowing a poppy except through its seed sprinkled on a hot biscuit in a delicatessen store. I would not like to think that "dancing daffodils" referred only to the "piece" my piano teacher insisted I learn before I took up the more interesting "shade of the old apple tree".

There are those who think that there is a "language of the flowers", and if you present one kind of flower to a friend it means something different from what is meant if you sent another. Frankly, I am almost wholly insensitive to this idea, although I might not feel complimented if someone sent me a spring bouquet of skunk cabbage. The first time I sent my wife a bouquet, long before we were married, a fuss-budget friend of hers was most intrigued by what was meant by the particular flowers sent. I still do not know what they mean, except that periodically she still gets the same kind, and that is enough for us—or for me, at least. It is almost as ridiculous to try to read hidden meanings into the thoughtful faces of the pansies, or the drooping heads of lilies, as it is to plot your life according to the philosophy of astrology. A star is a star whether it is in Gemini or Orion, and it has as much individuality as does any other part of Nature. No one who has read the spring crop of seed catalogs will ever feel that garden flowers, even of a kind, are all alike. No one who has ever tried to raise them can do anything but marvel at their infinite variation.

SIBERIAN SQUILL

CROCUS

There is no such thing as a Campernelle jonquil. There may be a plant sold to me by a seed house that advertises that name for the plant he sends. But, once I get it into my garden, it is my plant, and what happens to it from then on is largely due to my interest and to my efforts. Therefore, it is not for us to ascribe hidden generic meanings to the common flowers of our garden. Rather, it is for us to identify ourselves with our friends in part through the flowers we raise. I have a friend who is a crank on dwarf irises, and another who spends much of his spare time and cash on fancy dahlias. For years, I had in our garden some gladiolus plants that we always referred to as the ones "that Mr. Hayward gave us". A policeman in our town, who rarely smiles at those who try to smile at him when he is on duty, squirms like a happy puppy when we tell him how beautiful his beds of moss pink are each spring. We rarely let a spring go by without seeing to it that we drive by the gardens of these

(*Continued on page* 200)

COMMON NAME SCIENTIFIC NAME	ORIENTAL POPPY *Papaver orientale*	CALIFORNIA POPPY *Eschscholtzia californica*	BLEEDING HEART *Dicentra spectabilis*	GARDEN PINKS *Dianthus* sp.
DESCRIPTION	Height: to 4 feet. Stems: stiff, coarse, heavily haired. Leaves: finely parted, conspicuously haired with lower leaves less finely parted than the upper; frequently folded upward on either side of the midrib, with margins of the sections somewhat toothed. Rootstock: stout and perennial.	Height: to 2 feet. Often grown in clumps or in solid mats. Leaves: compound, with long petioles and slender divisions, with the basal forms larger than those borne above on the stems; usually rather pale green, often so abundant that the ground beneath is completely hidden from sight. While the plant may be hardy and perennial, it is common as an annual.	Height: to 2 feet. Profusely branched. Leaves: compounded of many broad leaflets that are light green and somewhat silvery when submerged in water, light, somewhat transparent green. Stems: relatively slender, rather strong, divided, somewhat ridged, usually drooped at the tips. Perennial. Hardy.	Flowers of considerable variety including the sweet williams and carnations and the clove pinks, China pinks, and maiden pinks. Clove pinks, *D. plumarius,* are low, usually under a foot in height. Maiden pinks, *D. deltoides,* have short, linear leaves that are smooth or roughish, and minute flowers. China pinks, *D. chinensis,* usually are tall, single-flowered, broad leaved.
RANGE AND RELATIONSHIP	Native of the Mediterranean region, but cultivated for many years and widely adopted as a hardy perennial ornamental for use in the flower garden. Related to the opium poppy whose seeds yield opium, which has figured prominently in the economic, social and political affairs of the world for a long period of time.	Related to the other poppies but in a different genus from the oriental, the corn, and the opium poppies. While the California poppy is available in a variety of colors, as are the others, nevertheless yellow seems to be the most common color here, while it is unusual in plants of true *Papaver* genus. Native of California and Oregon for most part.	Related to dutchman's breeches and squirrel corn of the spring woodlands. Favors loose, rich soil, well-watered and preferably with moderate shade. Also related to the fumitory, which has cultivated and wild forms. Native of Japan, but widely cultivated as a garden plant with a well-sustained popularity.	Clove pinks are native to Siberia, and on to Austria, but are widely established in gardens formal and otherwise. Maiden pinks are native to Scotland, Norway and Japan, and are usually grown outdoors in massed beds. China pinks are native to China and Japan, and are grown more for their individual beauty than for the mass effect.
FLOWERS	Flowers: gorgeous silky petalled, to 4 feet above the ground and to 6 inches across. Petals: brilliant, red, orange, salmon, pink, usually with a black spot at the base making the flowers black centered. Stamens: many and crowded around the pistil, which ripens into a fruit whose many seeds are shed through holes near the top.	Flowers: to 3 inches across, like shallow saucers with rather firm petals in comparison with other poppies, opening in bright sunshine, displaying the yellow, orange or cream colored corolla. Flowers do not long persist but are borne in great profusion for a relatively long time so the plant still remains colorful for a considerable time.	Flowers: like bleeding hearts hung from short stems suspended from a drooping wand. Flowers are commonly pulled apart by inquisitive children to find imaginary rabbits, harps, spectacles and a bottle. Conspicuous parts of flower are brilliant rose-pink. Blooms in early spring. Plants die back in summer.	Flowers of clove pinks: pink, white or red, fragrant, solitary or in 2s or 3s, with calyx lobes short and broad, with pressed tips; of maiden pinks: red, with a crimson center, ½ to ¾ inch across, with calyx bracts narrow, pointed, and spreading; of China pinks: solitary, pink or lilac, with calyx lobes, broad to leafy and spreading.
CULTURE	Ordinarily reproduced by cutting the roots after the flowering period, giving the parts time to develop sufficiently that the plants may bloom the next season. The best blooms, however, come from roots that have been undisturbed for more than a year. Has been freely hybridized by florists to produce remarkable forms.	May be planted as an annual, the seeds being sown early where the plants are to develop. It does best where there is much sun and considerable heat, and there is freedom from competition from other plants. In some areas, the plants may persist and bear flowers the following season, or the plants may self-seed, thus assuring their continuity.	Unless plants are marked in summer they may be lost in many gardens. Mature plants may be helped by dividing them in fall, or early spring, at three-year intervals. Transplanting is probably most successful in late fall, if plants can be found at that time after the leaves have vanished for the season.	Pinks resemble phlox flowers in many respects, but differ from them primarily in that in pinks and other members of this family petals of flowers do not grow together into a tube, although they may appear so, while in phlox a tube is formed by the petals.
IMPORTANT USE	One of the most popular of garden flowers for use in late spring and early summer. Of use only in the garden, since the flowers usually wilt quickly when cut, and the season is normally short, anyway. Massed at one spot with flowers of a single color oriental poppies are hard to beat as ornamentals.	Admirable plant for borders. Does better as a cut flower than do the true poppies and frequently seen worn as huge bouquets by pretty girls in rotogravure sections of the daily press. Because of popularity, has disappeared as a wild plant from much of its original range, and is now getting some legal protection to help survival.	One of the best of the old fashioned garden plants, sometimes persisting on sites of abandoned homes, but doing better where competitive plants are kept down by some spring and summer cultivation. Plant has few diseases and insect pests, so does well with comparatively little care.	Generally speaking, pinks are hardy plants that in most cases can survive in gardens with little care, or, if annuals, are able to yield an abundance of bloom with a minimum of care and expense. Since they are naturally found in more or less dry places they can survive in places and under conditions not favorable to many garden flowers.

SWEET PEA *Lathyrus odoratus*	PANSY HEARTSEASE *Viola tricolor*	GARDEN PRIMROSE *Primula polyantha*	NASTURTIUM *Tropaeolum majus*	PETUNIA *Petunia hybrida*
Slender but tough, climbing or twining vines to 4 or 5 feet long, with twining tendrils and relatively pale green, compound, somewhat clover-like leaves. Whole plant intertwines with self and with neighbors to make a rather dense mass of vegetation that must usually be supported by wire or brush if it is to be at its best.	Basal leaves: with broadly heart-shaped blades conspicuously sunken veins, coarsely but shallowly broken margins. Upper leaves: deeply parted to compound, alternate, with rather conspicuous smaller parts close to stem. Flowering stems: erect or prostrate, weak, easily broken, smooth, branched, green. Perennial or winter annuals.	Leaves: usually dark green, conspicuously veined, widest towards the tip, with rounded tips, clustered at the base of the erect, flower-bearing structures, without a white fuzz beneath, forming a more or less circular mat that is an effective clump for use in borders or in pots indoors.	Climbing or sprawling or otherwise. Leaves: with almost circular blades, borne on long, slender, succulent petioles, with light-colored veins and commonly with work of a serpentine miner showing conspicuously. Whole plant is smooth and pale green, with a not unpleasantly sour taste. Not hardy in snowy regions. Dependent on planting in North.	Sprawling, climbing or tufted plant usually found as an annual or as a house plant. Clammy, with short sticky hairs. Leaves: opposite, with relatively entire margins, rather thick, dark green, with conspicuous veins, usually with tips curved somewhat downward. Stems: root rather freely on contact with the soil. Roots: relatively weak.
At least a thousand varieties are recognized as being under cultivation, varying in size, habit, nature of flowers, hardiness, soil preferences, resistance to insect and fungous pests and so on. Is native of Sicily but has long been under cultivation in various parts of the world.	European small-flowered form is *V. arvensis*, and related American *V. rafinesquii* is found from New Jersey to Colorado and south to Texas. In latter, petals are delicate and longer than sepals. Cultivated plants popular in Europe and America and known as garden flowers since 1629.	Probably a hybrid of a number of species such as *P. elatior, P. veris* and *P. acaulis* of which the first was known as the oxslip; the second, as the cowslip; and the third, as the English primrose. In literature, we sometimes find the group referred to as *P. variabilis*. There are at least 200 *Primula* species cultivated.	Native of South American countries such as Brazil, Peru and Colombia, with many varieties having been developed during long years of cultivation in Europe and America. At least a dozen species are recognized as being cultivated plants, with many varieties, of course. These vary in form, habit, flower color, hardiness and vigor.	Related to the potato. Common varieties are usually hybrids of *P. violacea* and *P. axillaris*, both of which are native of the Argentine. Since the plant lends itself readily to crossing it has been developed in an infinite number of varieties based on color, habit, and shape, and number of petals.
Flowers: attractive, butterfly-like, fragrant, white, pink, purple or blue, either as pure colors or mixed. Flowering period extended considerably by persistent cutting of flowers and banking of roots with soil, and by enrichment with liquid manure. Seeds are grown for sale extensively on our West Coast.	Flowers: "pea-like" with broad, richly colored petals and a spur to the rear. Ordinarily, flowers are blue, white or yellow, highly fragrant, and borne in abundance if kept picked. In late season "cleistogamous" flowers that do not open may be found close to the ground. Seeds: small, brown, expelled from bursting fruits.	Flowers: borne in relatively loose clusters that are erect, many-colored but commonly yellow to red, orange, brown, white or maroon or varicolored; commonly with apparently a smaller corolla set within the larger in "hose-in-hose" type. Blooms in earliest spring. Tremendous variation.	Flowers: conspicuous, open-mouthed trumpets with a long, nectar-bearing spur to the rear and whole flower balanced individually at the end of long, flowering stems. Flowers vary in color from pale to dark yellow, to orange or maroon, or even purplish. Some are scarlet or a golden red. Seeds: large, coarse, edible, few.	Flowers: normally deep - throated funnels sometimes to 5 inches across, with backward-bent margins and rather substantial supporting sepals. While flowers do not persist long, the flowering habit is sustained, so plants provide color from early season until heavy frost or snow. Pollination probably normally by insects.
Seeds are usually soaked in water and sowed in trench to six or eight inches deep, being at first lightly buried, but as the season advances more and more earth is piled about the root system, maintaining the vigor of the plant. Many are grown in greenhouse for sale by florists, while others are grown in fields for commercial sale.	Seeds sown in fall, in loose soil, with plenty of water and in shade. Seedlings are transplanted and set about 3 inches apart. After soil is firmly frozen, a straw mulch supported by branches is useful in giving winter protection. Mulch is removed gradually in spring and flowering begins promptly.	Seeds sown as soon as ripe, or may be sown in boxes indoors in early February in equal quantities of loam, sand and leaf mold. Plants by mid-May can be set out but will not bloom first season. Are replanted in September for spring blooming and are covered for winter with light mulch. Best in house at 45° to 55° F.	Ordinarily, in North, seeds are sown about May, or after danger of frost, at spot where the plants are to grow. They require good soil but should not be manured as climbing forms may then yield abundant vegetation but few flowers. Plants should be thinned to stand about 1 foot apart, and climbers are helped by pinching back.	Seeds are planted in finely broken soil, thinly covered and kept well watered. Plants are thinned so that each has as much as a foot or 1½ feet freedom from competition from other petunias. Bloom in the house. The night temperatures of the room should drop to around 45° F. to get the best results. Plants may be divided freely and safely.
Plants must be kept up off wet soil to survive some of its fungous enemies. So valuable are the cut flowers that plants are often grown wholly in greenhouses, being started in small pots and transplanted when sufficiently developed. There are many sweet pea societies interested in improving this popular plant.	A most popular garden plant with some flowers to 3 inches across, richly colored, and rather long-lasting. An ounce of seeds contains over 25,000 seeds capable of producing some 4000 plants. Fall plants transplanted to greenhouse at 40° to 60° F. will yield winter blooms for market purposes.	Popular house and garden plants ever since Shakespearean times. The name *Primula* implies "first" and refers probably to early bloming habit. Plants may persist many years, and when large may be divided satisfactorily, developing into satisfactory plants for borders or for pots.	A popular, easily grown, attractive flower that gives good vegetation and excellent flowers. Young shoots and young seeds are sour to peppery and are frequently eaten raw or pickled or used in preserves of different sorts. Plant louse pests may be eliminated with pyrethrum or nicotine spray. Do best in full sun and in poor soil.	A most popular plant for borders and window boxes, or where conditions are right for use in the house. Some double forms are not fertile, and must be propagated by cutting rather than by seed. A large plant in the fall may be cut into fragments and the sections rooted indoors to start new plants for use the next year.

COMMON NAME SCIENTIFIC NAME	SIBERIAN SQUILL *Scilla sibirica*	CROCUS *Crocus* sp.	DAFFODIL *Narcissus pseudo-narcissus*	SPIDERWORT *Tradescantia* sp.
DESCRIPTION	Height: to 6 inches. Flowering stalks: 1 to 5, rising from buried, scale-coated bulb. Leaves: rather succulent, to 5 or 6 inches long, and ¾ inch broad, blunt. *S. peruviana,* reaches to height of 1 foot; English bluebell, *S. hispanica,* to 20 inches; *S. amoena,* 6 inches.	Height: to 8 or 10 inches. From the flat-topped, rough-fiber covered corm arise the leaves. Leaves: grass-like, dark green, with a white strip down the middle, parallel-veined, enclosed in a papery sheath at first, and to 10 inches long. The roots, from the base of the corm, are fibrous.	Height: to 18 inches. Grows from a deep bulb that is to 2 inches or more in diameter. Flowering stem; smooth, semi-succulent, easily broken. Leaves: 4 to 6, all starting from the base; flat, smooth, to 18 inches long, and to 1 inch broad, sometimes with a whitish bloom.	*T. virginiana:* a relatively common species, has green, flat, linear leaves, the uppermost of which are somewhat downy. Bracts beneath the flowers: leaf-like, long, usually extend at right angles from main stem, or upward. Leaves: all keeled. Stem: unbranched, to 1½ feet high.
RANGE AND RELATIONSHIP	*S. sibirica* comes from Russia and southwestern Asia; *S. peruviana,* from the Mediterranean region; *S. nonscripta,* from Great Britain and vicinity; *S. hispanica,* from Spain and Portugal. Star Hyacinth, *S. amoena,* comes from mid and southern Europe, as Germany and Italy.	Native of Europe and Asia, mostly from Italy to southern Asia. Common species include the fall-blooming *C. sativus,* or saffron crocus, and at least 4 spring-blooming species. Among these latter are the yellow-flowered *C. moesiacus,* and *C. susianus,* the Cloth of Gold crocus, and the blue, white, or yellow *C. biflorus* and *C. virnus.*	Native from western Europe to Sweden to England, Spain and Austria. More popular varieties include Golden Spur, Empress and Ajax. Favors deep, loose, very wet soil but will grow in grass meadows either in the open or in the shade of nearby trees.	More than 30 species of genus, of which *T. virginiana* and the wandering jew are sometimes cultivated. *T. virginiana* ranges from Maine to Virginia and west to Rocky Mountains. More common in the western part of its range.
FLOWERS	Flowers of *Scilla* have but one nerve in each of the conspicuous segments instead of 3 as in *Camassia.* They appear early, with leaves. *S. peruviana* has more than 50 flowers, while others rarely have to 20. *S. sibirica* has 3 or less flowers to a flowering stem; *S. amoena,* 4 to 6; and *S. nonscripta,* at least 12.	In most species, the flowers appear the first thing in spring. They are usually goblet-shaped, 3 to 5 inches long, with slender tubes, with 3 sepals, 3 petals, 3 stamens, and 3 parts to the ovary. Reproduction is most commonly effected by offshoots from the corm, although seeds may be produced and used.	Flower: one, on the end of the flowering stem, with a trumpet to 2 inches long, and a frill of petals that are relatively narrow. Flower: pale yellow, held horizontally, pointing somewhat upward, or drooping. In the large-crowned narcissus, the trumpet or crown is as long or longer than the segments.	Flowers: in clusters at the tip of the stem. Sepals: thickly covered with hairs. Petals: a rich, purplish blue, to 4/5 inch long, therefore conspicuous. Flowers do not last long, and wilt quickly if the plant is picked for a bouquet. Pollinated by queen bumblebee, which eats the pollen.
CULTURE	Squills are grown mostly for their early appearance and their hardy qualities. Siberian squill blooms for but a few day; English bluebell may bloom from April to June. For most part, they need not be disturbed for years, although a good top dressing in the fall may do no harm.	For indoor growing, plant 6 or 7 corms in a 4-inch pot or flat, in late summer or fall, in a mixture of equal parts sand, garden soil and rotten manure at a temperature of 45°F. at first in the dark, then after a few weeks raise temperature to 60° and then to 70°. Seeds produced at ground surface easily overlooked.	For blooming indoors, bulbs are planted 1 to a 4-inch pot, in a mixture of 1/3 sand, 1/3 garden soil and 1/3 manure, and kept in dark until rooted, first at around 45°F.; then after rooting, the temperature is raised to 65° and water is supplied in abundance. Place in sunshine when flowers are about to open.	Spiderworts Tradescantias in general are considered hardy hothouse plants and the wild forms seem able to survive difficult conditions. Railroad embankments in in the middle West are often blue with their flowers in season. They are all easily propagated by cuttings.
IMPORTANT USE	Scillas may be raised or forced in greenhouses by putting a half-dozen bulbs in a 5-inch pot with soil, keeping them cool until growth starts and giving them little water. When growth has started, the temperature may be raised and the amount of water increased.	One of the most popular and effective of the early spring flowers, but to get the best results, bed should be dug up at least once in 3 years, and the corms separated and replanted. The plants do best if there is an abundance of moisture at time of blooming. Corms set out outdoors in October should bloom early the following spring.	"I wandered lonely as a cloud That floats on high o'er vales and hills When all at once I saw a crowd,— A host of golden daffodils Beside the lake, beneath the trees, Fluttering and dancing in the breeze." —*Wordsworth*	Aside from being attractive wildflowers and garden plants, spiderworts are useful in supplying material in biology classes for studying circulation of protoplasm. This is seen easily and well in the hairs found in the centers of the flowers of many species.

GERMAN IRIS *Iris germanica*	TULIP *Tulipa gesneriana*	TIGER LILY *Lilium tigrinum*	SUMMER CYPRESS BELVEDERE *Kochia trichophylla*	GARDEN COLUMBINE *Aquilegia caerulea*
Height: to 3 feet. Stems: branching, usually, with 2 flowers at the top, one on a short, and one on a longer lower branch. Rhizome: stout, creeping, and for the most part exposed, with numerous roots coming mostly from the lower side. Leaves: broad, stiff.	Height: to 2½ feet. Leaves: 3 or more, on the lower part of the stem, to 4 inches broad, and a foot long, smooth, parallel-veined, with entire margins, uniformly green, and usually with edges curved upward in early stages at least. Leaf-surfaces: vary in different varieties.	Height: to 4 feet. Stem: purplish brown, covered with cobwebby substance. Leaves: 75 to 100, crowded, each 4 to 6 inches long, more or less clasping at the base, narrow, straight or curved, and with bulbils in their axils. Bulb: to 4 inches in diameter, spherical, white or yellow, or tinged with purple or red.	Height: to 5 feet, much branched, and forming a usually symmetric, rather compact, global, pyramidal or egg-shaped unit. Branches: slender, striate, close to the main stem, and bearing the slender leaves that are to 4 inches long and usually a pale, fresh green in summer, turning, in late summer or fall, to a brilliant red in some forms.	Height: to 3 feet. Smooth below, but slightly fuzzy above. Basal leaves: divided into twos, smooth above and somewhat fuzzy beneath, or rather with a grayish bloom on the lower surface. Substantial root system of the usual herbaceous perennial.
Native of central and southern Europe, the German origin implied by the name is definitely disputed. Many varieties of the species have been developed, and it hybridizes with some others. It prefers rich, well-drained, limestone soils, endures half shade, and much drought, and suffers with heavy winter mulch.	Native of Russia and Asia. Developed for garden purposes extensively in Holland and Denmark and long imported into America. Was first grown in Europe, possible in Austria in 1554, in England in 1577. Now one of most popular spring garden flowers. Some 60 species and many more varieties.	Native of China and Japan but naturalized as an escape in Maine and New York. There are several natural and cultural varieties of them having double flowers, some being paler in color of flowers; some being larger in every way.	Native of China probably, but introduced in gardens in many parts of the world. Some 40 species of *Kochia* in the world including the white sage, *K. vestita* of our western salt deserts, and *scoparia,* a garden ornamental, native of central Europe. Summer cypress does well in areas that in late summer are relatively dry, such as along paths and roadsides.	This species native of Rocky Mountains. There are to 50 species found in north temperate regions of which this is probably basis of most of blue garden columbines. Other types are known as *chrysantha* and the Canadian to garden trade, and are kinds most frequently recommended for garden use.
Flowers: large, showy, purple, yellow, white, or of intermediate or mixed hues. The conspicuous parts, of 3 upright standards and 3 drooping "falls." Above the "brush," on the "falls," are the stamens, covered by a sterile part of the style of the pistil, the stigma being beyond the end of the stamen.	Flowers: one to a plant, erect, 2 inches or more high, and, when open, twice that width, not fragrant. Typically, the flowers are scarlet, with a blackish, purple center, but may be yellow, or white, or almost black. Anthers: purple or yellow. Fruit: a capsule that produces many seeds.	Flowers: horizontal, or slightly declined or drooping, opening wide, without a tube remaining, orange-red or salmon-red, with black spots, and with apparently long pistils and stamens. From 1 to 15 flowers on a plant, each 3 to 5 inches in diameter and with conspicuous red anthers on the stamens. Lower buds open first.	Flowers: in ball-like clusters, some fertile and others not, those on lateral branches eventually bearing fruits and seeds that are small and enclosed in persistent calyx. Seeds may be planted indoors in April, and seedlings set out in May, or seeds may be sowed outdoors in May in North. Should be thinned so that one plant should be 3 feet from next.	Flowers: to over 2 inches across, blue and white with spurs not curved inward or hooked at tips and with flowers in this species erect and not nodding. Sepals: to 1½ inches long, deep purple. Petals: white, with pale blue spurs, to about 2 inches long. Stamens: not protruding from flower. Fruits: about 1 inch long, curved.
Rhizomes are best divided in July and August. They are planted horizontal to the surface, about 8 inches apart, and deep enough to be half covered with the earth pressed close around the divisions. Water is needed during the blooming period, and weed competition should be kept down for best results.	Best known of the fancy varieties are the Darwin tulip, a tall, late-flowering variety with deep colors; and the parrot tulip, with the segments of the flower crisped or wrinkled around the edges. In the open, tulips are planted in the fall, mulched with straw and should bloom by spring.	One of easiest grown of all lilies. Hardy, survives neglect, and yet is as beautiful as most of its relatives. Grown in old fashioned gardens and shown in pictures as typical of the garden fence in a New England home. Bulbils from leaf axils produce flowers in 3 or 4 years. Plant fall or spring, 10 inches deep in rich, loose soil.	Summer cypress is useful in gardens since it continues to stand and be attractive in the fall after other plants have been killed by frost, and because of its fresh greenness and regular shape early in the season.	Seeds sown one year develop into plants that should bloom next and should increase in size from then on. Since plants cross, it is best to destroy those that are not desirable so that future seedlings from stock may be as wished. Recommended that plants be bought and in this way be assured of good stock.
Excellent garden and path flower. To control crown and pod borers, spray with lead arsenate and destroy infected part, wash contaminated rhizomes with weak potassium permanganate. Dust parts affected by leaf blotch with sulphur, and burn parts affected by sclerotic rot.	Tulip bulbs may be potted in the fall and stored in a cool place to get roots established. This should take 8 to 12 weeks at 45° F. Then, forcing at 70° to 80° F. for 3 weeks should produce blooms, or at higher temperatures may be forced to bloom in 10 to 14 days. Lowering temperature holds flowers.	Bulbs planted in June should produce flowers about October 15. Those potted in July may give flowers at Thanksgiving time. Potted tiger lilies need much fresh air and comparatively little water to be at their best. Bulbs formerly imported from Japan seemed to be among the best.	Deserts with white sage may not be expected to yield crops without irrigation but may be worked profitably if irrigation is available to remove undesired alkali. The summer cypress may seed itself on soils that are suitable but may not be easily established where it is too wet or too hard.	Native state flower of Colorado. Other relatively common garden species include those from Japan (incurved spurred) *A. flabellata,* and *A. glandulosa. A. sibirica* of Siberia, common *A. vulgaris* of Europe and Siberia, and straight spurred *A. formosa* of our west coast and Siberia, *A. skinneri* of Mexico and *A. chrysantha* of our West.

persons, whom we know professionally but appreciate personally because of our common interest in flowers.

I suppose I might devote this whole section of this insert to the details of establishing and maintaining a spring flower garden. I could tell you when, how and why to spade, to hoe, to rake and to mulch. I could tell you what sprays to use for this, and what dusts to use for that, and how to prune, to divide and to store the tops or the bottoms of the various plants at various times of the year. I might warn you against crank advertisements, about the dangers of weed-killer sprays, about the glowing promises of the radio announcers. But, as I see it, all that is outside the province of this insert. You can find most of these matters associated with the culture of your plants in reputable and standard books of reference. Your own agricultural college, or the United States Department of Agriculture, probably stands ready to give you more specific and appropriate advice than I could possibly give you.

We are not in position here to recommend specific sprays to help you destroy the particular fungi or insects that may be making trouble in your graden. What we can do is suggest that, if you have any such trouble, the chances are good that someone in your state agricultural college would be pleased to give you the advice you need. All it costs you is the postage to send a small, fresh sample to assist in making the necessary determinations. This will not cost much, and it should yield satisfactory results.

Another bit of advice is that you make a practice of driving around your home town a bit to see what your neighbors do with their flower gardens. If you see some plant particularly attractive and do not know the name of it, I think you will do well to ring the door bell and ask the name of that "wonderful plant" they have in the front yard. You may ask where you can get similar plants, and believe that, in most cases, you will be offered a few plants to take home with you.

In looking over the plantings made by others, do not be satisfied by saying that you are just favorably impressed by what you may see. Try to analyse why you are so affected by what you see. Does a hodgepodge of color make as good an impression as a mass of one color? Do you like conventional designs marked out with plants of different appearance? Do you find that, with some plants, the color that appeals to you may be caused by the foliage rather than the flowers, and that where one depends on foliage for color the effect is likely to last longer? As you drive about your neighborhood for the next few weeks, notice whether some place that appears attractive from its orange crocuses may be just as worthwhile a week later because of yellow daffodils, and, later, because of red tulips and white narcissus, blue iris or red peonies. Of course, if you have ample time and energy, you could plant new flower crops each week or so, but this is hardly necessary if you do some intelligent planning. I think that most of you will agree that there is merit in masses of a single color in some spots in your garden; that it pays to have something of interest each week or so, and that change is intriguing and worthwhile if it can be attained without too much time and labor and money.

If you are planning a spring or summer flower garden, then see to it that there is a rotation of emphasis, that people will be so intrigued by what is going in one part of the garden that they will not be disturbed by the uninteresting aspect of another part that will take the spotlight later on. Learn to know the value of placing tall plants in the background, with the plants in the foreground shorter and shorter. At the borders, you may find a place for such sprawlers as the white sweet alyssum or the colorful portulacas. Do not plant your pansy bed behind the hollyhocks unless you want them for your own particular use, and even then you may not have luck because the pansies may not get enough sunlight. Plan to let your plants cover obnoxious but necessary fences and boundary markers, and, do not forget, what you do in your garden in the summer and fall may determine what you will have there next spring.

I am of the opinion that, while it is fun to raise your own seedlings, you can take care of the needs of a small garden by purchase without extravagance. It may prove more satisfactory if you arrange with a number of your neighbors so that you can raise the petunia seedlings for the whole neighborhood, while others go in for pansies, zinnias, asters and so on. A little bartering with home-grown plants is fun, and it is much easier to grow many of one kind than it is to grow a few of many kinds. Of course, you may find, as I have, that some of your neighbors will expect you to make a contribution to their gardens without reciprocating. Such situations will gradually work themselves out, and if you have made your contributions you will not be concerned about the shortcomings of others.

Schools sometimes maintain little garden projects for the benefit of their pupils. I knew one California school that raised practically all of the ornamentals that were used in planting about municipal lands. It should not be unreasonable for a school to undertake the raising of seedlings for home use. Such an activity might well be more worthwhile than some, such as the making of models and drawings of extinct dinosaurs that no child ever saw or ever will see.

I know that the school gardening idea is relatively sound, that city children should at least read about what goes on on a farm, and that every young couple should be allowed at least once in their lives to start a garden of their own. But these activities, at their best, are only makeshift substitutes for the satisfaction that comes from maintaining a family flower garden for a decade or so. When such a project is maintained, some plants will be popular for a few years and then yield to other species. Neighbors, too, will come and go. Some will appreciate your garden, and others will not. Some will enjoy good-natured competition as to the amount and quality of your products. You may rib each other across the fence as you put in some choice tulip bulbs, or you may hand your neighbor a spray of roses and commiserate with him that he is unable to do as well by you. All this is what makes living in the atmosphere of a family flower garden worthwhile. Just as the garden keeps the family together, so gardens keep the neighbors together. Really, I know of no more democratic institution than the American family flower garden at its best.

Wildlife as a Profession

WHETHER we like it or not, our wildlife resources, particularly those species that are classed as "game", must be increasingly managed. This will be achieved, broadly, through restriction of seasons, bag limits and the like; specifically, through management of game animals as a crop, ideally adapted to the carrying capacity of the habitat, the surplus being harvested. This ideal is only rarely achieved today because of the insatiable demands of hunting pressure and the money interest involved, but it is, nevertheless, a goal if we are to maintain our wildlife both for the enjoyment of those who like to observe it, and for those who find pleasure in killing it.

Twenty-five years ago such "management" of wildlife resources as there was consisted of liberal gunning seasons and bag limits. Only a few voices of warning had been raised up to then; only a small chorus urged a scientific approach to wildlife control. Hornaday, Forbush, Leopold, Dutcher, Preble, McAtee and a few others comprised this minority. In the past quarter-century, however, there has grown up the profession of "wildlifer", or "game manager". If this profession can be followed, free of political domination or gunner control, and purely on a sound scientific basis, it holds the only hope for the future of our wildlife. This, too, is an ideal as yet only imperfectly achieved.

In the Autumn, 1947, issue of the Wildlife Society *Newsletter*, John H. Lewis interestingly explores the profession of Wildlife Technician. He discusses the calling from the viewpoints of interest, ability and opportunity. He emphasizes that anyone entering the profession should do so because of a compelling interest in wildlife and the outdoors; with a concept of service; with anticipation of fair but not considerable monetary reward.

As for ability, Mr. Lewis points out that few occupations call for as many abilities. He says that "individual abilities will spring from the basic truths of integrity, perseverance, ability to plan, faith, vision, initiative, and courage. Out of these truths and their application will come leadership, respect and success."

"Because," Mr. Lewis continues, "the wildlife technician is working with a product of the land, many of his tasks will be of menial nature. If you don't know that there is a hard and an easy way to use a pick and shovel, the chances are that somewhere along the way you will learn. If a blow-torch and a soldering iron are foreign now, it is likely that you will get acquainted. The double-bitted axe, the harrow and plow, the rowboat, the carpenter's square and the T-square, the library and laboratory, the fire-axe and frow, the incubator and food grinder, the gram, the ounce, the centimeter and the packhorse—all or any of these will have more than a speaking acquaintance with you.

"Sleeping bags, pancake flour and strychnine will become commonplace in your experience, but so will the spring song of the meadowlark, the splash of a jumping trout, the crash of an elk through the coppice, the moonlight chant of the coyote, the rattle of oar-locks in the fog-enshrouded bay, and the ominous bark of the poacher's gun. You will become interested in architecture both ancient and modern because you, and later your loved ones, will usually find that you have lived under a variety of roofs through the years."

Turning to opportunity, Mr. Lewis indicates that this is growing. In 1942 close to eight thousand persons were employed in some phase of wildlife work, the vast majority by State and Federal agencies. In this connection it should be reported that a nationwide survey of opportunities for employment in this field was made under the joint auspices of Cornell University, the Wildlife Management Institute and the American Nature Association by Dr. David Turner. His report is shortly to be published jointly by the two last-named organizations.

Currently, due in no small part to veterans' benefits, there are many young men studying in the field of wildlife management. There is real danger, according to some authorities, of there being an overproduction of technicians, and that it may be difficult to absorb all of them in the field of their choice. Nevertheless, those who are wholly dedicated to this profession should have no difficulty in finding their place in it.

Thus the wildlifer holds the golden key to the future of our wildlife resources. There is, however, one disquieting factor that, we feel, cannot be ignored. It bears directly upon the scientific independence we regard as so vital. Virtually all of the wildlife management work being done today is financed from funds supplied by hunting and fishing licenses, from duck stamp sales, or from the arms and ammunition tax expended under the Pittman-Robertson Act. This is gunner's money. It gives the gunner a feeling of control over this work, and it cannot help but influence, to some degree, those being paid from these funds or expending them. Such a basically unsound system ignores that large segment of the population which does not hunt or fish. They, too, have their stake in the future of our wildlife.

Cork Tree from Spain

By GEORGE LAYCOCK

In the largest cork "forest" in the United States, Bidwell Park, Chico, California. These cork oaks, *Quercus suber*, were planted in 1904. A number of the trees were stripped in 1940 and yielded a good quality of cork.

PHOTOGRAPH FROM CROWN CORK AND SEAL CO.

ONE hot afternoon in 1939 Charles McManus, a Baltimore manufacturer, pulled his car to a sudden stop on a highway in southern California. Growing near the road was a foreign-looking tree that resembled those he had studied in southern Europe. As he walked toward the tree he realized that his identification had been correct. Here were cork trees that had somehow migrated from Europe to our Pacific Coast.

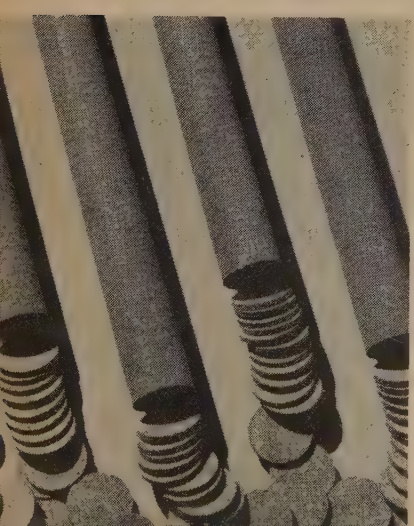
He was aware of the possibilities of this discovery. "It's quite possible," he thought, "that we could grow almost enough cork in this country to supply our demands." Perhaps, however, he thought, this domestic cork, regardless of what Californians say about the versatility of their climate, could not equal Spanish cork in quality. A few hours in his laboratory would give him the answers.

With the permission of the owners he stripped bark from several of these misplaced plants and shipped it back to his laboratory in Baltimore. When he returned to the East and the quiet privacy of his laboratory, he began to test the American-grown cork bark. When he had finished he was convinced of one interesting fact—no cork, shipped from Europe, had higher value than this newly discovered home-grown product. He began immediately to organize a program for planting new cork forests and making Americans conscious of the possibilities of cork production.

Each year we use one half the world's supply of cork. In our homes and factories it is assigned a long list of duties. It is used for bottle stoppers, linoleum, gaskets, insulation and even to make cork tips for cigarets. During the second World War, cork became a critical material. The Army needed it for tanks, bomb parts, and other purposes. The Navy could use all it could procure to insulate submarines, make life preservers and other items essential to modern warfare.

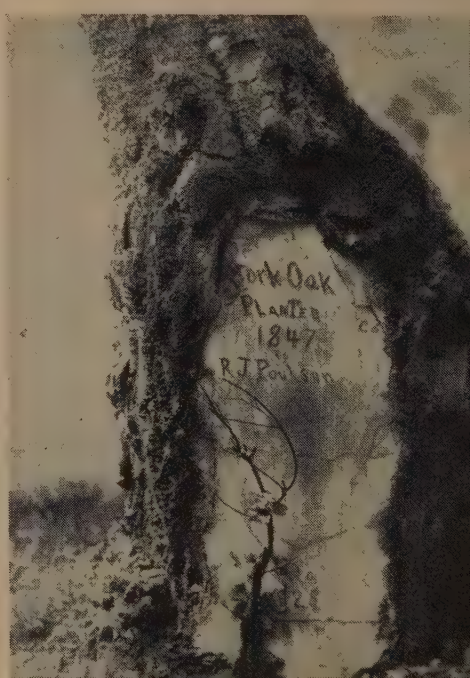
The Government quickly channeled much cork from civilian supplies into military stocks. Still the armed forces needed more. Our supplies were steadily reduced and threatened. The McManus Cork Project had started too late to help, so the Army tried some of its own ideas.

Military technicians tried such substitutes as pine needles and dried grasses for packing materials, but found nothing that could take the place of bark



Composition cork made by compressing ground cork that would otherwise be wasted. The finished rods of compressed cork are extruded by a machine and sliced into thin discs that become the resilient liners of bottle caps that preserve the bottle contents.

PHOTOGRAPH FROM CROWN CORK AND SEAL CO.



This cork tree, which has just passed the century mark, is one of three believed to have been smuggled into the United States from Spain by Musco Essex. It grows today in Accomac County, Virginia, and is the only one of the three trees remaining. Virginia State Chamber of Commerce Photograph.

stripped from the cork oak. No other material had all cork's qualities of heat resistance, buoyancy and strength, for more than half the volume of cork is air. One cubic inch of the light bark contains more than 200 million cells, each of which has fourteen tough, resinous walls.

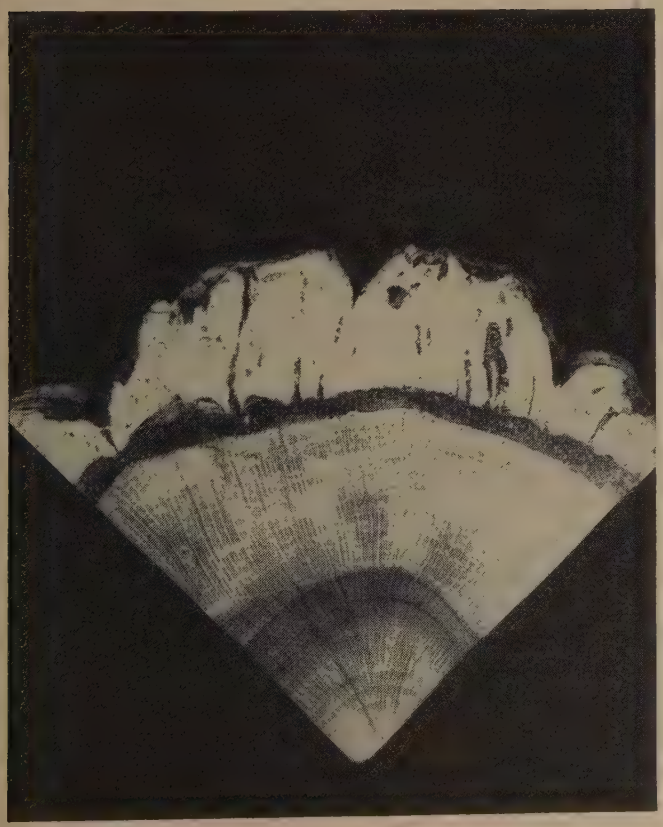
Under the McManus Cork Project we are now planting cork trees in twenty-two of our Southern states. The acreage is growing yearly. Another national emergency might find us growing within our own borders enough cork for our needs.

McManus had help in locating those cork trees that we now know to be scattered across the southern half of the nation. Hundreds of interested farmers and science club members began tracking the trees down, and soon learned that California and Arizona already had a total of more than four thousand. Smaller numbers were found elsewhere throughout the South.

Each year acorns are gathered from all these producing cork trees. Imported acorns have arrived in weakened condition and produce poorly. Last year the Crown Cork and Seal Company, which administers the McManus Cork Project, distributed more than a million cork oak acorns and seedlings to American land owners who requested them. They were asked only to plant and care for the trees according to simple directions.

The United States Forest Service joined in the research on cork trees. State foresters and agricultural leaders have cooperated generally in the work of checking cork trees and helping to plant cork forests.

Quarter section of a cork log showing the thick outer bark that provides cork and replaces itself, the thinner inner bark and the wood of the tree.



Woodbridge Metcalf, University of California extension forester, and two Crown Cork and Seal Company specialists, strip 1050 pounds of cork from a large tree at State Hospital, Napa, California. This is the largest cork oak in the country.

The cork trees that McManus found in California did not grow there naturally. They were brought to this country as acorns during the last century, for the idea of growing American cork is not a new one.

The first American to take the cork tree seriously as a possible tree for this continent was Thomas Jefferson. When he traveled to Europe he mailed cork acorns back, and with them sent notes describing the trees and urging his friends to plant them on their southern estates. The trip was long and few of the acorns lived, for they easily lose their viability when they get too hot and dry. Most of our mature cork trees were planted by the Government in 1858, when the Patent Office imported the stock from Spain and distributed it throughout the South. Other trees were planted earlier in the Southwest by Spaniards, who recalled with a twinge of nostalgia the cork forests of their homeland. These are the trees that today supply acorns for new plantings.

Our biggest cork tree is a giant, nearly ninety years old, growing near Napa, California. It has a spread of 125 feet and reaches seventy-five feet into the air. Chico, California, claims the largest cork "forest" in the country, although it contains only six hundred trees. There are several mature cork trees growing in Virginia, Alabama, Georgia, the Carolinas and in 22 states in all. Citizens of Norfolk, Virginia, say that the cork tree growing there (Continued on page 218)

Schoolroom in the Woods

By WILLIAM G. SCHULZ

High school boys and girls at Omak, Washington, enjoying a forestry lesson in their own school forest and tree farm.

WHEN school bells rang out early last September up in the little mountain town of Omak, Washington, boys and girls of the local high school embarked upon a new and interesting adventure in combined outdoor and indoor education. They are now the proud custodians of a hundred-acre tract of quality pine forest, donated to the local public schools by the Biles-Coleman Lumber Company of Omak.

From now on, it is entirely up to these and future pupils at the high school to operate and care for this, their own tree farm, school forest and woodland laboratory. And, mind you, this goes for the girls just as much as for the boys.

Educators and foresters familiar with the project predict this is something that will make history in America. They believe it may well set a pattern that in time will spread to many other areas in this country where sustained forest resources are vital to the local economy.

No longer will the daily routine of these high school young folks be confined to the traditional book-study, classroom and "lab" work, although these will, of course, continue to be essential. Henceforward, a goodly part of their schooling will be right out in the woods—in Nature's own classroom.

The tract donated to the schools lies just at the edge of the tiny settlement of Disautel, about fourteen miles by all-year, paved highway from Omak. Students will shuttle back and forth "between classes" in school busses or in their own cars.

Omak lies up in the rugged Okanogan highlands of north-central Washington. Here is one of the greatest ponderosa pine regions in the West. Lumbering and other wood-product industries, along with a varied agriculture—stockraising, fruit, grains, hay—are the very lifeblood of this town and numerous other communities like it scattered throughout much of the Pacific and Rocky Mountain West. Forestry and farming in such areas are inseparably linked. Devastate the forest cover, the brush and rangeland, either by fire or by careless and rapacious cutting, and what is the result? Ruin of the watershed, destruction of the topsoil, and depletion of the water supply so vital to the local agriculture.

The tract selected for this school forest and tree farm is by no means some half-worthless or burned-over piece of logged-off land. While there has been cutting in past years, the forest is still in vigorous, healthy condition. It is forest that from a lumberman's standpoint still has a lot of potential sawlog dollars in it.

More than a year ago, the Biles-Coleman Lumber Company asked several foresters to look over the company's holdings and select a tract suitable for donation to the schools. Just any wooded area would not do. It must offer full opportunity for actual field work in natural science classes, no less than for practical conservation study. It must, in short, be a fully equipped outdoor classroom. And so, after extensive investigation, the wooded tract near Disautel was selected.

This means that Omak high school boys and girls, even though they may never take up any kind of work involving forestry or wood products, will gain a down-to-earth appreciation of what it means to conserve our great, green-gold heritage. They will learn all the elements of multiple-use of the forest: fire prevention and control, tree growth and reproduction, identification of species, the fundamentals of selective logging and sustained yield, reforestation, fencing, range management and controlled grazing, and insect, disease, and erosion control.

And that is only the beginning. This school forest will serve for extensive outdoor "lab" work and field study in the sciences—soils chemistry, physics experiments, botany, zoology, geology, entomology—even for photography classes. The whole area will be photographically type-mapped annually by pupils in the high school photography classes. Then—ten years from now, fifty years from now—the condition of the forest at any particular year can be compared with its present state, and significant changes noted.

Dedication of the forest took place early last summer with fitting ceremonies. (Continued on page 218)

The Living Fossil

By ALLAN D. CRUICKSHANK

Photographs by the Author

For miles along the coast thousands upon thousands of the horseshoe crabs, like queer amphibious tanks, were crawling up on the beaches to lay and fertilize eggs.

It was late in March. A brisk southwesterly wind was urging the waves to sweep ashore with more vigor. For more than two weeks I had been studying and photographing birds along the gulf coast of Florida. In all of this time only a few horseshoe crabs had been encountered. But now, with the coming of this great spring tide, the amazing invasion was taking place. Pair after pair of horseshoe crabs, the smaller male clasping the female, were coming ashore in that annual, irresistible urge to deposit their eggs in the sand. As the pulsating tide surged onward, the numbers of horseshoe crabs increased, until, for miles along the beaches, sandspits and mudflats, thousands upon thousands, perhaps millions upon millions, of these queer-looking, amphibious tanks were swimming ashore and crawling up on the land.

In most cases only a single male was seen clinging to a female. Periodically, however, I noticed two males in tandem, and, on two occasions, as many as three being towed along by a larger female. The males are merely pulled along to the spot where the female is to deposit her spawn, and when these eggs are deposited in the slight excavation made the males emit their fertilizing milt. Scientists have estimated that a large female lays some 10,000 eggs, eggs so small that all 10,000 can fit in a pint jar. The movements of the waves soon bury the eggs and they are left to develop by themselves. The length of time required varies from three to ten weeks, or more, depending on the temperature conditions prevailing in the locality at the time. As one might expect, only a small percentage of the eggs ever hatch. Some are washed up on the too-dry

The horseshoe crabs play their part in Nature's intricate relationships. Boat-tailed grackles were all along the beaches, feasting on marine life and crab eggs pushed to the surface.

sections of the beach; some are carried into too-deep pools; some are devoured by fish, others by birds. Emerging from its egg, the tiny, tailless horseshoe crab shows a remarkable resemblance to its ancient forbear, the trilobite. Having a strong sense of gravity, the young immediately head downhill, and into the shallow waters. During the first year the young horseshoe crab molts several times, grows a tail, and, on its first birthday, has reached a length of an inch to an inch and one-half. In four years it becomes sexually mature. Growth apparently continues for about a decade, when some specimens reach the impressive length of two feet.

In spite of its name, the horseshoe crab, often called king crab, sword-tail or limulus, is not a crab at all. In fact, it is the sole survivor of an otherwise extinct group of animals, and, consequently, it is often referred to as a living fossil. As descendants of the trilobites, the crabs have endured unchanged through millions of years. Horseshoe crabs exactly like those

Among the birds that found horseshoe crab eggs to be a delicacy were the gulls, like the laughing gull at the right and the ring-billed gull below.

found today were crawling on the tidal flats even before the first bird, the archaeornis, was attempting to prove that an avian creature could exist in the highly competitive world. The horseshoe crab is indeed an amazing creature. Biologists have frequently differed in opinion as to its exact niche in the classification of animals, but now it is included with the arachnoids, and is therefore considered related to the spiders, mites and scorpions.

Our Atlantic Coast species of horseshoe crab, *Limulus polyphemus,* occurs along the eastern seaboard of North America from Yucatan to Maine. A few minutes' inspection of the accompanying photographs will give one a far better idea of what these animals look like than pages of written description. To the modern eye they look like queer, amphibious tanks. They range in color from green to gray, brown or even black. The long tail, being pointed, can draw blood if grabbed carelessly, but it is not the dangerous weapon that many a timid soul considers it to be. In spite of its large, compound eyes, the horseshoe crab has poor vision. From my observation along the beach I should be surprised if these animals can do more than differentiate between light and shade. They just move forward, constantly bumping into stones, logs and human feet without making any advance efforts to avoid the obstruction. Breathing is accomplished by

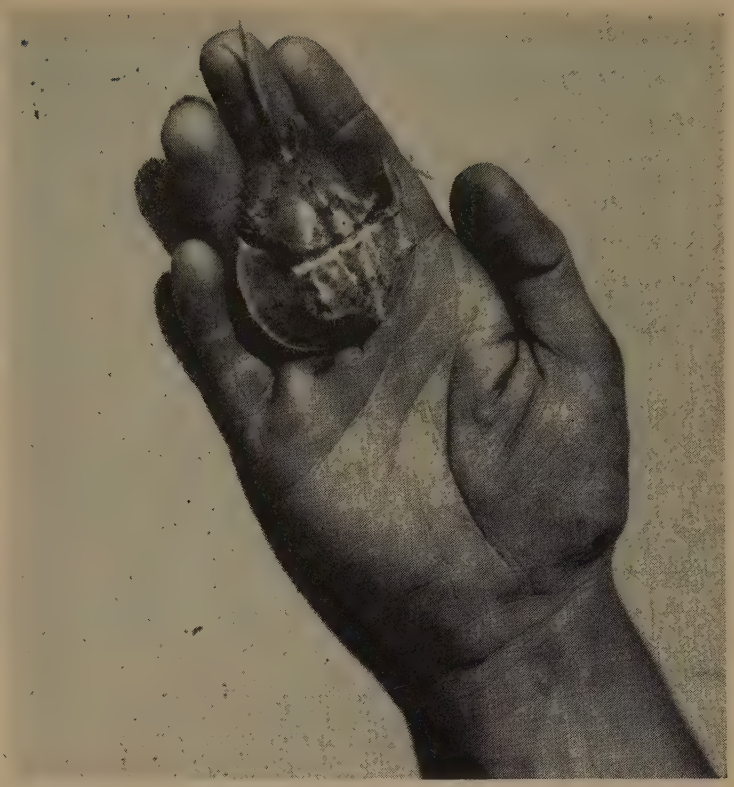
a series of plates known as book gills. These are attached beneath the rear section of chitinous shell. Although used primarily for gathering oxygen, they have a secondary function, that of propulsion. Occasionally with a sudden burst of speed the horseshoe crab will be propelled away from a source of irritation by an energetic flapping of the book gills.

Except during their annual breeding pilgrimages to the sand flats, the horseshoe crabs live chiefly in salt water ranging from one to six fathoms. Like their ancient forbears, the trilobites, they carry their teeth on their legs, teeth that rip up food before it is swallowed.

The horseshoe crabs are of little commercial use. They are edible, but even the largest specimens have so little flesh that man seldom uses them for food. In some sections quantities are killed and scattered over the fields as fertilizer. Occasionally they are gathered as food for pigs and chickens. They are in no immediate danger of being wiped out, but we must be alert and never allow this interesting living fossil to vanish from the earth. Although still common over most of their normal range, they no longer occur in the quantities described a century ago, when, during the breeding season, more than a million to a mile were reported.

The strange, complex interrelationships in Nature never fail to interest me. In places I saw pigs prowling the mud flats and chewing upon stranded horseshoe crabs for the little nourishment that they offered. Furthermore, as the horseshoe crabs burrowed in the sand, small crustaceans and other forms of marine life were forced to the surface. Ring-billed gulls, herring gulls, laughing gulls, boat-tailed grackles and

By its first birthday the horseshoe crab attains a length of from an inch to an inch and one-half.



various shorebirds seized this opportunity for a free meal. All along the beaches and sandpits these birds were feasting on the marine life—and undoubtedly the horseshoe crab eggs—as they were churned up to the surface.

Thus we encounter one example of the many interesting associations in Nature, bringing together quite different forms as a part of the greater scheme of things. Recognition of these interrelationships is a basic part of Nature knowledge and of the study of Nature.

My main reason for being along the gulf coast of Florida at this time was to study and photograph the bird life. Ornithology is my undisputed, primary natural history love. Yet in all fairness I must admit that on this trip no spectacle of the avifauna was more impressive or more stirring than this great annual invasion of the hordes of horseshoe crabs.

★

Color Language of Nature

By MABEL IRENE HUGGINS

The letters V, I, B, G, Y, O, R may be rattled off glibly by the schoolchild to recall the arrangement of the colors in the rainbow, but the subtleties of Nature's color effects is not finished when we say "violet, indigo, blue, green, yellow, orange, red." Can you match the colorful adjectives in the left column with their definitions from the right column? Fourteen correct is passing; sixteen, good; and eighteen, excellent. Answers appear on page 218.

A

1. —— rubineous
2. —— argent
3. —— cerulean
4. —— aureous
5. —— verdant

a. sky-colored
b. golden
c. ruby red
d. green
e. silvery white

B

6. —— stramineous
7. —— ebon
8. —— plumbeous
9. —— murrey
10. —— sorrel

f. mulberry-colored
g. reddish- or yellow-brown
h. black
i. lead-colored
j. straw-colored

C

11. —— amaranthine
12. —— rufous
13. —— tawny
14. —— virescent
15. —— dun

k. reddish-brown
l. dull, grayish brown
m. greenish
n. purplish
o. brownish-yellow

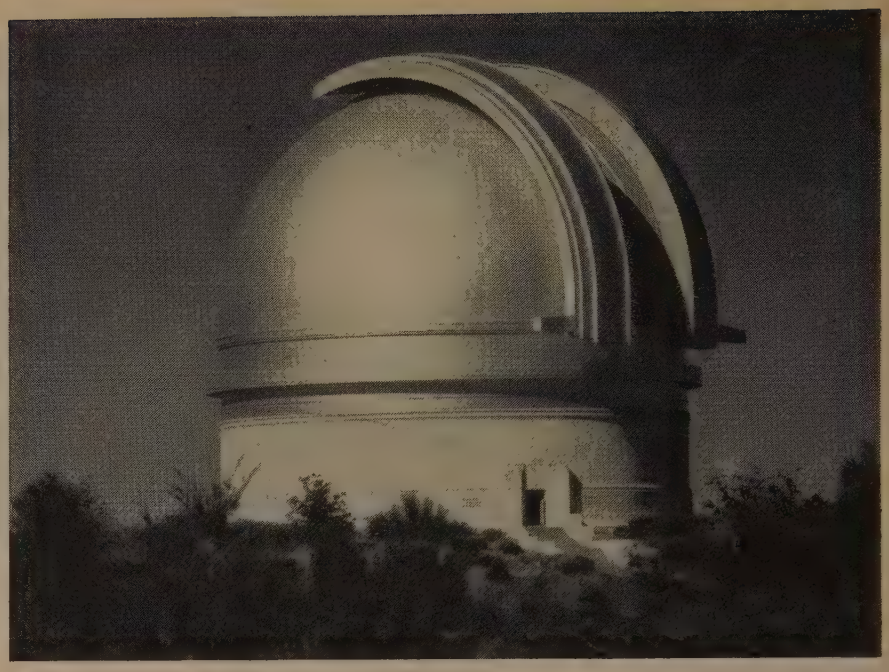
D

16. —— vinaceous
17. —— ferrugineous
18. —— piebald
19. —— cinereous
20. —— roseate

p. spotted in two colors
q. rose-colored
r. ash-gray
s. rust-colored
t. wine-colored

Seeing A Billion Light Years

By ISABEL M. LEWIS



The two-hundred-inch telescope dome on Mount Palomar, looking south.

THE 200-inch mirror of the greatest of reflector-type telescopes is now at last safely installed in its mounting atop Palomar Mountain, 130 miles south of Pasadena, California, and it is expected that its first research program will be undertaken this summer.

In 1935 the Corning Glass Works at Corning, New York, succeeded in casting the huge disc for the mirror, making it out of Pyrex glass after an attempt to cast a mirror of pure quartz had failed. The mirror was cast in a form entirely different from any other type of mirror. It has been likened in shape to a waffle split in two from edge to edge, with a smooth face and cellular back. There is a solid glass front approximately four and one-half inches thick, and a much thicker cellular back. The total thickness is about twenty-four inches at the edges and twenty and one-half inches at the center. In the center is a hole forty inches in diameter. The telescope may be used with any one of three types of focus—Cassegrain, Coude, and Prime Focus, and the hole is necessary when the Cassegrain focus is used. The casting of the mirror with a cellular back reduced its weight, and also made it possible to mount it so as to be supported at thirty-six points. The solid part, since it is so shallow compared to the total thickness of the mirror, will adapt itself much more rapidly to changes of temperature than it would if it were solid glass throughout. This is a very valuable feature, since it is essential to keep as nearly uniform a temperature as possible to obtain good observations with any type of telescope, and to reduce to a minimum the effect of sudden temperature changes. Distortion of the image is also prevented through an even distribution of the weight at the thirty-six points. This is possible because of an intricate system of mounting, which allows the finest possible adjustments to be made in using the telescope.

The grinding and polishing of the mirror were begun in April, 1936, soon after the huge disc, then weighing about twenty tons, had completed a spectacular and hazardous trip almost from coast to coast. Dr. John A. Anderson, executive officer of the Palomar Mountain Observatory Council at the California Institute of Technology, directed the figuring of the mirror, and Marcus H. Brown was in charge of the mechanics of the grinding and polishing. The work was done in a specially designed optical shop at the California Institute of Technology at Pasadena. It was completed in September, 1947, and the mirror was then taken, on November 18 and 19, 1947, by truck and trailer, to the observatory, which had been built to house it on the top of Palomar Mountain.

The present weight of the 200-inch mirror is fourteen and three-quarters tons. In grinding and polishing the face to the form of a parabolic surface, which is accurate within two millionths of an inch, five and one-quarter tons of glass were removed, and thirty-one tons of abrasive and polishing pitch were used. Nearly eleven and one-half years were required to complete the polishing of the mirror, although about four years were lost during the war when CalTech opticians were engaged in war work.

In addition to the 200-inch mirror, which is the primary and most important mirror, there are six auxiliary mirrors to the telescope. These can be used in different combinations to produce the image of the object to be observed at any one of three different focuses. Three of these mirrors are plane and three are convex. These mirrors are so mounted on the telescope that they can be moved out of the way when not in use.

The 200-inch telescope is, in effect, a huge camera, and, although it is possible to look at the image of a celestial object with direct vision, this will not be

done in carrying out research programs. Photographs will be taken on specially prepared film. One great advantage of photographic over visual observations is that permanent records are obtainable. These can be examined at leisure and filed away for future reference. Another advantage is that exposures can be made and light accumulated in the image of the object for hours at a time. An object, whose existence would not even be suspected by an observer using the telescope visually, can be brought into view as a result of long-continued photographic exposure. With the aid of the 200-inch telescope it will be possible to photograph objects at a distance of a billion light years from the earth. A light year, it will be remembered, is the distance that light travels in one year at 186,000 miles in one second, or about six million, million miles. The most distant objects now within reach of the 100-inch Mt. Wilson reflector are at distances of approximately 500 million light years.

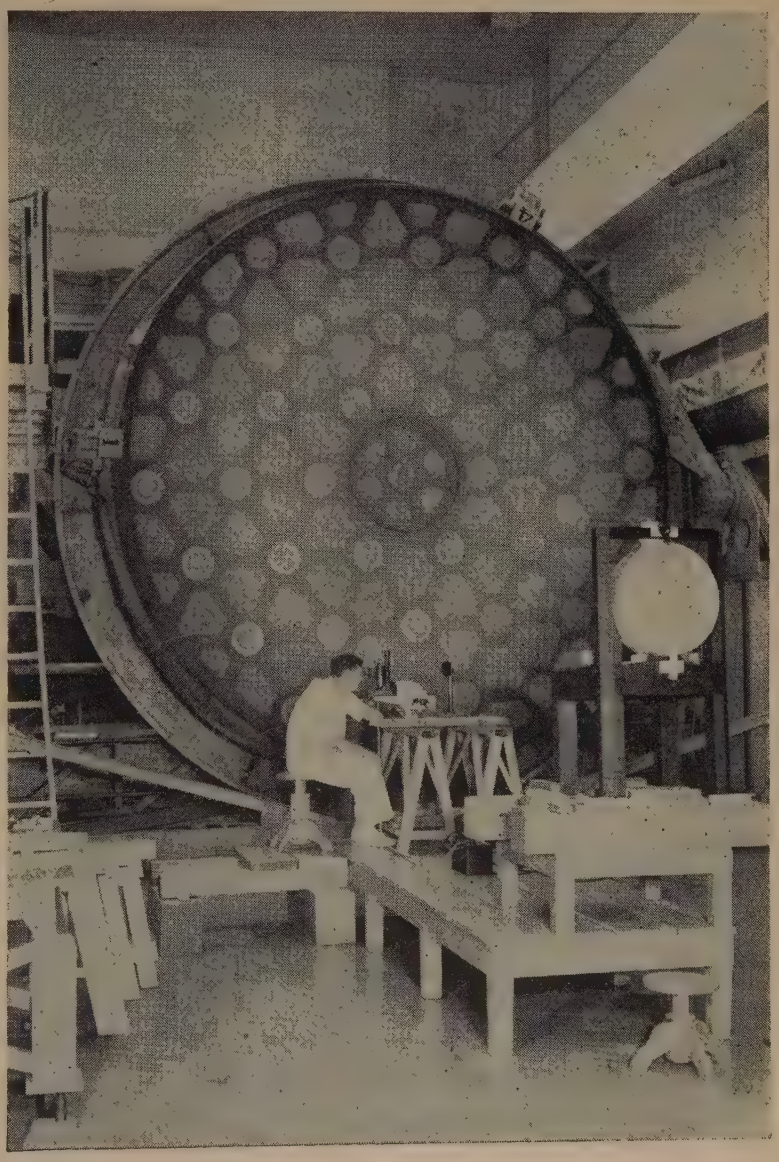
The tube of the new telescope, as well as the 200-inch mirror, are new in design. The telescope not only carries the great mirror at its base, and six auxiliary mirrors, but the observer, as well, in a cage at the Prime Focus of the telescope. This is the first instance in which the observer actually "rides" the telescope. Circular rings are attached to the telescope tube so that one supports the 200-inch mirror and its cell, and another, above, supports the cage in which the observer rides at the Prime Focus. The tube with cage weighs 140 tons and is fifty-five feet long and twenty-two feet in greatest diameter.

Many engineering problems had to be solved in connection with the mounting of the telescope, which was of the equatorial type and of a new design. One remarkable feature was a new and revolutionary type of bearing, a pressure-oil-pad bearing, which utilizes a system of forcing oil through bearings at a pressure that will float the entire instrument, weighing 500 tons, on a thin film of oil.

One of many other problems that had to be solved was how to keep the tube in balance when the auxiliary mirrors were moved from one position to another on the telescope tube. Counter-balances were designed so that, when any mirror combination was placed in position to receive an image of an object to be observed at the Casegrain or Coude focus, these counterweights moved in such a way as to keep the telescope in perfect balance. In the construction of the various gears required in the mounting of certain parts of the instrument the most exact precision grinding was necessary, and this was done in the CalTech astrophysical machine shop.

Using a simple push button, this enormous, 500-ton instrument can be set in motion. It is possible to have the telescope set automatically to predetermined star positions, or the position of any object it is desired to photograph. When set in motion the telescope will then move to the predetermined position and follow the object across the sky.

The dome of the telescope is similar to that designed for other telescopes in recent years. It is made almost entirely of steel, and is 137 feet in diameter and 135 feet high. Its weight is 1000 tons. The dome building is insulated to keep temperature rise during the day at a minimum, and little difference exists between inside and outside temperature when the dome shutter is opened at night. There are three floors to the dome building and the instrument is on the third or observation floor. Visitors will view the instrument from a glassed-in room so that body heat will not



Marcus Brown, in charge of the optical shop at the California Institute of Technology, tests the new mirror for Mount Palomar.

To use this map hold it before you in a vertical position and turn it until the direction of the compass that you wish to face is at the bottom. Then, below the center of the map, which is the point overhead, will be seen the constellations visible in that part of the heavens. It will not be necessary to turn the map if the direction faced is south.

affect the temperature of the air near the telescope.

This great scientific instrument in the new observatory on Palomar Mountain represents the dream of a great astronomer that has come true. Although he lived to see the work well advanced, he died before its completion. The late Dr. George Ellery Hale, more than any other one man, was responsible for the 200-inch telescope on Palomar Mountain, as well as the Mt. Wilson Observatory, of which he was the first director. There he made important discoveries in astrophysics. It was through his efforts that the money for the 200-inch telescope and observatory were obtained from the Rockefeller Foundation in 1928. The California Institute of Technology was given, in all, more than six and a quarter million dollars for it.

The research problems that will be undertaken by the 200-inch telescope will be similar to those undertaken by the 100-inch telescope on Mt. Wilson. With the aid of the 200-inch instrument it will be possible to gather more light from the stars and obtain better spectra, thus obtaining a better knowledge of the physical nature of the stars and the source of stellar energy. Far distant spiral nebulas will be studied to better advantage, and countless objects, whose existence has been unknown up to this time, will become visible at great distances from the earth. Light will be thrown upon the problem of the expanding universe and the structure of the universe as a whole. Although the 200-inch telescope may be used to settle the controversy as to the nature of the "canals" of Mars, because of its great light-gathering power, and photographs may be taken of the moon and planets in testing and trying out the performance of the telescope, it is not planned to use the telescope for planetary work. It was, in fact, not designed for that purpose. A great future awaits this remarkable scientific instrument in exploring the depths of space that are within reach of no other telescope in existence, and it will make possible research programs that will utilize to the greatest advantage the telescope's enormous light-gathering power.

Among the planets this month Venus may be seen as a magnificent object high in the western sky after sunset. It will reach greatest eastern elongation on April 14, when it will be visible for more than four hours after sunset. Mercury (Continued on page 218)

A Ghostly Milkweed

By THEODORE E. ECKERT

ONLY about three feet from the edge of the macadam road, in coarse soil that contained much gravel and crushed rock, grew a milkweed. But this was no common milkweed—except that it was *Asclepias syriaca*—for it seemed pure white, was strikingly beautiful and completely devoid of green pigment. Actually the color was a faint yellowish-white or cream. A deeper yellow tint was noticeable in the terminal cluster. The stem, leaf petioles and midribs were pure white, but the network of veins appeared transparent. The color and general aspects of the albino were recorded on six Ansco color transparencies.

The albino was an object of striking beauty, completely devoid of green pigment.

The albino appeared to be the smallest of a colony of about a dozen milkweeds. It measured ten inches from the base of the stem to the terminal cluster, while the average height of the green associates was twenty-four inches. The albino bore twenty-two leaves averaging an inch shorter and a half inch narrower than those of the normal shoots.

The albino shoot was in a most unfavorable location. It was doubtful if it could long survive the passing of cars and trucks; surely not the mowing of the grass and weeds along the roadside. In hope that the shoot might survive long enough to bear seeds, it was transplanted to what was considered a safer location. That it did not contain enough food in its underground parts to survive for long was soon apparent. Within a week the shoot was dead.

The transplanting and subsequent death of the albino indicated that it had been cut from its food supply. This could have been through an underground connection to some of its green associates. Such a connection seemed highly probable because this milkweed commonly spreads by means of rootstocks.

The chances of definitely establishing such a connection had been diminished by failure to do so when the albino was transplanted. But, after some fruitless digging around the original site, the broken frayed end of the rootstock to which the albino had been attached was finally located. This was carefully traced a distance of about three feet to an underground system supporting three green shoots. There can be no reasonable doubt that a connection between the albino shoot and the green ones existed before the transplanting occurred.

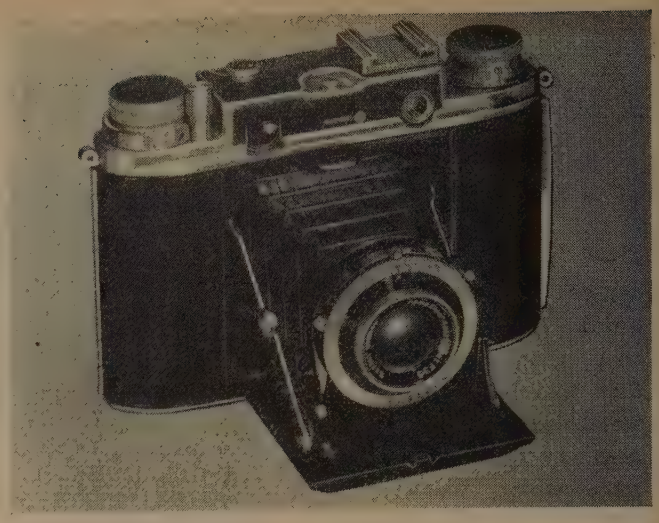
The condition of albinism in the common milkweed is probably rare. The writer, while having seen great numbers of this plant, has never before observed an albino plant. Reasons for the lack of green pigment in this particular plant cannot be stated with certainty. The condition may have been the result of a mutation in the bud that gave rise to the shoot. However, the soil about the underground system of the albino was a barren type of roadfill containing crushed limestone and having a pH value of 7.2. In this environment the shoot may have experienced a deficiency of iron salts, making it unable to manufacture green pigment. The reasons for such occurrences must be many.

Cases of complete albinism are always interesting. In plants that reproduce by creeping rootstocks, as does the common milkweed, there are unusual opportunities for the study of the albino condition. Since, in this type of plant, the albino may be connected to normal green shoots, it can mature and produce seeds. Seeds from albino shoots might be useful in heredity studies of the condition. In case such a plant is found one should first let it mature and bear seeds. He should then establish that it is or is not connected to a green shoot. After this he might attempt to keep the albino growing after separating it from the green parts. Such separated albinos should provide excellent material for the study of organic nutrition.

The writer takes pleasure in acknowledging that this plant was called to his attention in June, 1947, by Mrs. Ernest Jenks of Whitney Point, N. Y.; that Mr. Fred Kallenbeck, opposite whose music studio in that community the plant grew, and Mr. John Crosley assisted in observing, transplanting and photographing the albino; and that expert guidance and advice were given in preparing this paper by Dr. E. Laurence Palmer, Dr. R. T. Clausen, Dr. O. F. Curtis, and Dr. L. Knudson of Cornell University, and by Dr. R. E. Woodson of the Missouri Botanical Garden.

Camera Trails

By EDNA HOFFMAN EVANS



This is the Commando, a British-made 2¼ x 2¼, that is focused by moving the film channel instead of the lens. It has shutter speeds from one second to 1/200th.

Last month's expedition into photographic history carried us through the development of the Daguerreotype, which was a mercury image on a silvered copper plate. This one should bring us up to date.

Incidentally, plates made by Daguerre's process should not be confused with two other types of photography—the ambrotype and the better-known tintype. This latter moved from the realm of photography into the annals of slang, and the expression "not on your tintype" was considered extremely witty in the days when a fellow took his girl out riding on a bicycle built for two.

Technically speaking, the ambrotype was a negative image on glass made by direct exposure in the camera. This image was whitened and, when backed with black varnish or, even, velvet, gave the appearance of a positive picture. The tintype, on the other hand, was a whitish silver image on a black-lacquered metal plate—usually sheet iron.

The Daguerreotype process remained popular for about fifteen years after its invention. Meanwhile, photographers continued to do research, and, before long, an Englishman named Fox-Talbot went back to the experiments of Wedgwood and Davy, revived the system of using silver nitrate, and soon the silver-coated copper plates of Daguerre were replaced by glass plates covered with silver salts. Thus, Daguerreotypy became an outdated phase of photographic history.

Besides his re-employment of silver salts, Fox-Talbot has other discoveries to his credit. Most important of these was the latent image, a barely visible image that could be developed further by the use of gallic acid and silver nitrate solution. This cut down exposure time, for while Daguerre left his plate in the camera until the image was clearly visible, Fox-Talbot obtained his image in half a minute and developed it later.

Not only was Fox-Talbot the first man to develop the latent image, but he also was the first to make a negative and use it for printing. His first negatives were made on paper coated with common salt and then brushed over with a solution of silver nitrate to form silver chloride. Later he discovered that silver iodide in the presence of weak reducing agents was far more sensitive to light than silver chloride. The pictures were then printed on silver chloride paper. His process, sometimes known as Calotype and sometimes as Talbotype, was patented in 1841.

The next advance in photography came from the substitution of glass for paper as a carrier for the light-sensitive material. Albumen, actually the white of egg, was used to hold the silver iodide, and the resulting plates, although very slow, gave beautiful, transparent negatives of fine grain.

Wet collodion was substituted for albumen in 1851, and for a quarter-century thereafter photographers made their own plates whenever they wanted to take a picture. Since the collodion-coated plates had to be exposed while wet and developed immediately after exposure, photographers had to carry a regular darkroom wherever they went. Brady, and his staff of cameramen who "covered" the American Civil War, used this process, and their odd-looking covered wagon darkrooms were familiar sights, even on the front lines.

Landscape photographers operated the same way, and so did explorers. One Britisher, for example, took hundreds of sheets of glass with him while exploring the Sudan region in Africa and made 12 x 15 negatives of the sights he saw.

Eventually, the cumbersome wet collodion process was supplanted by gelatin dry plates, and the manufacture of photographic materials moved out of the individual darkroom into the world of business. As early as 1880 the Scovill Manufacturing Company was advertising dry plates as especially suited for outdoor photography, and a copy of the company's ad, published March 23, 1880, in *The Photographic Times*, illustrates this section of "Camera Trails." Note the sizes and prices of plates available to Nature photographers of sixty-eight years ago. Incidentally, the Scovill Manufacturing Company was later combined with the E. and H. T. Anthony Company to form the present day Ansco Corporation.

Another name familiar to modern day photographers appeared first in 1880 when George Eastman started to make dry plates on a small scale in Rochester, New York. Four years later his promising business was incorporated as the Eastman Dry Plate and Film Company. But Eastman's success did not lie in the dry plate field. Instead, he is credited with the invention of the well-known roll film system, which threw open the gates of photography to everybody.

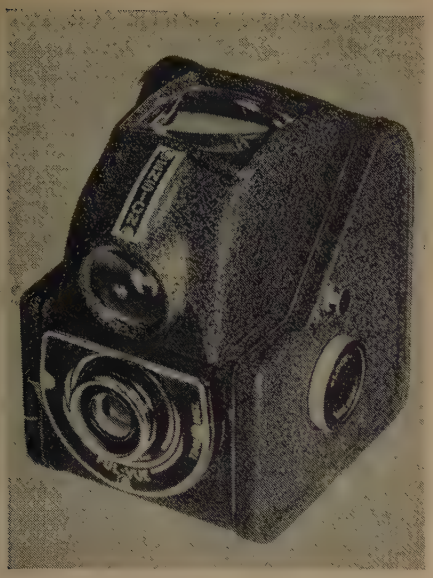
To supply outlets for his new film, Eastman ventured into the camera business, and the first Kodak was marketed in 1888. (Kodak No. 1 can now be seen at the Smithsonian Institution.) The first Kodak was a box camera, in appearance not too unlike its present-day descendants. It was simple and convenient to use, and, as a further enticement for the beginning photographer, the Eastman Company agreed to do the developing and printing for the amateur, as well as to reload his camera each time he finished a roll. The trade slogan for that early Kodak was: "You Press the Button, We Do the Rest."

Experiments with film continued, and by 1891 cameras could be loaded outside a darkroom without exposing the sensitive film to light. By 1895 the first "Pocket Kodak" was designed and 25,000 were manufactured in the first lot, allowing a quarter of a million camera fans to begin clicking their shutters. The "folding Pocket Kodak" came along in 1898, and, as the nineteenth century merged into the twentieth, the first "Brownie" camera intended for children was put on the market. Thus, less than half a century ago, photography emerged from the laboratory and invaded not only the parlor, but the nursery as well.

Today, photography is a big business. Eastman is one of several organizations devoted to the manufacture and sale of photographic material. But the following items indicate just how big the business of keeping cameras clicking has become.

Outside the U. S. Mint, Eastman Kodak Company uses more silver than any other company or organization, consuming some 12,000,000 ounces of the world's purest silver each year for photographic purposes.

To control production and processing conditions and to air-condition the buildings where Kodak films and papers are made,



This British-made Ful-Vue camera of rather unusual design is all metal, has two-position focusing, and can take "time" or instantaneous exposures.

the company operates a refrigerating unit with an average daily production equivalent to 15,000 tons of ice.

To provide the 20,000,000 gallons of water required daily by the Kodak plant and laboratories, the company maintains its own water plant and purification unit on the shore of Lake Ontario. A better than mile-long pipe, 58 inches in diameter, was installed recently to meet increasing demands for fresh water.

A staff of more than 500 people is continually searching for additional information on the "why" and "how" of picture taking in the Kodak research laboratories.

So photography has progressed, from the days of the camera obscura, when philosophers, chemists, physicists, astronomers and similar followers of scientific pursuits dabbled in it, to the present day, when it is scarcely possible to toss a used film tab into a crowd without hitting another camera fan.

Improvements continue to be made, and the camera family grows larger and more complex each year. Just think back. If you are too young to remember the first movies, or even the first sound pictures, you surely can recall when home movies were rare and privately-owned movie cameras rarer, when color film was just beginning, when lenses were uncoated, when film speeds were much slower than they are today. Even if you cannot remember the choking puff of smoke that resulted when the village photographer set off a charge of flashlight powder in an open holder, you probably can recall the days when flashbulbs were used only by press photographers, when candid cameras first became popular, and when twin-lens reflexes first appeared on the shelves of camera stores.

Of course, these two "Camera Trails" sections devoted to the history and development of photography have hit only the high spots. There are numerous other processes and experiments, some successful but cumbersome, some almost fantastic, that might have been included. Some important steps may have been omitted. It would be possible to write volumes before exhausting a subject as extensive as photography. The Smithsonian photographic display includes such items as the megalethoscope, revolving stereoscope, and graphoscope, as well as forerunners of movies and movie projectors having names like zoetrope, periphanoscope and zoopraxoscope. It is impossible to include them all.

Nature subjects always were favorites with the photographer, and a platinum print titled "In the Canadian Rockies" looks just as attractive in its Smithsonian case as it must have several generations ago when the exposure was made. Photography has come a long way since then, but the raw material of a good Nature picture remains the same—patience, perseverance, skill and some luck on the part of the photographer, plus a camera that will record faithfully, and a natural subject or scene to be recorded.

SECOND MILEPOST

So much for the history of photography. Here is another flight into the past, although not such a long one. This section marks the passing of the second annual milepost of "Camera Trails" under Evans management. During the past year the section was quoted twice, once in *North Dakota Outdoors* and once in the bulletin of the Nature Camera Club of Chicago. Getting quoted gives a nice feeling.

Next to getting quoted, starting an argument is the most fun, and "Minicam Miseries" in the January section seems to have done just that. Several loyal 35mmites have leaped to the defense of their respective cameras. Next month we will hear more from them.

NEW ITEMS

As for new items, Eastman has issued a booklet for camera fans who are planning trips by airplane. The booklet, "Pictures from the Air with your Camera," answers questions about shutter speed, exposure, filters, and even the best side of a plane to sit on while taking aerial pictures. It sells for twenty-five cents.

From England have come four new cameras, the Commando, Autorange, Selfix and Ful-Vue, now being sold exclusively at Dowlings, Inc., 570 Fifth Avenue, New York City. The Commando, highest priced member of the quartet ($199.75, tax included), is focused by moving the film channel instead of the lens. At the other end of the price scale the Ful-Vue ($12.95, tax included) is an all-metal box-type camera with an odd design. Notice the illustration and see if you do not think so, too.

Scientific Book Contest

Whittlesey House and *Science Illustrated* announced their second biennial prize contest in the Whittlesey House Fellowship Awards for books on scientific subjects written for the layman. The current contest opened December 1, 1947, and closes November 1, 1948. Full details may be obtained from Beulah Harris, Science Editor, Whittlesey House, 330 West 42nd St., New York 18, N. Y.

Antioch Fellowship

A graduate fellowship in forestry, wildlife management, or conservation education is being offered at Antioch College, Yellow Springs, Ohio. Full details may be obtained from Dr. Kenneth Hunt, director of Antioch's 1000-acre Glen Helen.

Conflict in Days

In order to avoid conflict with celebration of Mothers' Day, Sunday, May 9, the American Humane Association has changed its Humane Sunday date to May 2. Be Kind to Animals Week will now be observed from May 2 to 8.

Dutch Elm Disease

Faced with the threat of the Dutch elm disease to New England elms, the New England Trust Company, 135 Devonshire Street, Boston, Mass., is distributing, on request, a leaflet on control of the infection prepared by the Massachusetts Forest and Park Association.

THE PHOTOGRAPHIC TIMES. 291

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This advertisement, now included in the Smithsonian Institution's photographic display, was published March 23, 1880.

The School Page

By E. LAURENCE PALMER

Professor of Nature and Science Education, Cornell University, and Director of Nature Education, The American Nature Association

THE FLOWER GARDEN IN SPRING

In "Snow White and the Seven Dwarfs" one of the feature songs most of us remember well was the "Dig, Dig" song. When the snow-white mantle of winter begins to vanish from the face of the earth, most normal persons who have the opportunity seem to want to get out and dig, dig, dig in whatever spot is available. While most of the major digging in the home garden plot centers around the vegetable garden early in the season, some of it is to be found in the flower garden.

Schools might find it interesting to see what definite sequences are followed in the various home gardens, and to note how these vary with the kinds of flowers to be found in them. Certainly we do not treat an established pansy bed the same way we do a bed of hyacinths, nor do we treat the hyacinths the way we do the spot where we usually grow our nasturtiums or sweet peas. Teachers who must use matching tests to measure accomplishment could set up various lists of garden activities and have the children match these, as well as they can, with different kinds of flowers to be found in the gardens. For example, I am thinking of a plant that grows in my garden and for which the accepted procedure is as follows: Dig a long, deep, straight trench after danger of frost has passed and to a depth of about five or six inches. Be sure that the earth is loose and relatively fine in the bottom of the trench. Soak the seeds to be planted in water overnight. Plant the seeds and cover them lightly with soil. Erect a wire or some other support on which the plants may climb. When flowering has begun, clip the blooms with scissors. As the season progresses fill in the trench gradually so that the roots become buried deeper and deeper. Is the previous description suitable for hyacinths, tulips, hollyhocks, sweet peas, nasturtiums or pansies? If you do not know the answer, then look over the special insert in this magazine to see where it best fits into what is recommended. Then make similar descriptions of garden activities for other kinds of flowers. See how well the children can match the flowers with the appropriate procedures.

Of course, there will be many who will say that they cannot maintain gardens because they do not have the space. This seems ridiculous when we remember what we have seen on the fire escapes in crowded cities. Mrs. Comstock once was hard put to find areas in which to have some New York City children maintain their gardens. Ingenious as she was, she finally turned to the garbage cans and collected abandoned egg shells. These she had the children fill with earth. Each child wrote his name on his shell and planted his seed in his own little garden. The idea worked, and for many years the egg-shell garden was a standard schoolroom activity, not only in cities but in the country where superior garden sites were readily available.

School teachers may care to evolve other types of lessons related to garden flowers. Some may think it essential for children to understand the morphology of the plant parts used in propagation. Judging from what we find in the most recent of the elementary science texts, this is a most dangerous pathway to follow. Some teachers may see in a flower garden color and more color, and may suggest activities centering around recognition of these colors, using them appropriately in art work. We hope that these teachers will take such an activity seriously and not give the first prize to some sheet on which a child had merely been trying out his brushes.

Some schools have made a school flower garden a source of stimulation for the development of the finer side of life. The products have been used to send to those who, for reasons beyond their control, have been confined to the indoors where gardens are not the common thing. Indeed, what better use can be made of a garden than to use it to bring a smile to the face of someone who may feel inclined to look otherwise? There is no community where there is not someone who would appreciate a flower grown by children, and brought by children after having been picked by children. Flowers brought to us have such a disarming effect that they may often smooth the most rugged pathway that lies before us. When we think of Gandhi going to his funeral pyre in a cloud of rose petals, of the ginger leis that the Hawaiians hang around your neck when you step off the boat at Honolulu, when you remember the May baskets we hung to our best friends when we were kids, we are merely acknowledging the emotional bridge the flowers often help to gap.

There may be those who contend that all flowers should be left unplucked. Of course, we know what results from this practice when it is applied to our pansies, nasturtiums, roses and sweet peas. The flowering period merely becomes shortened. Why, then, can we not be realistic and recognize some flowers as legitimate harvestable surpluses? Of course, we must be intelligent in this and recognize that, while some species prosper under a heavy plucking program, others do not. This only points to the need for a better understanding of things related to the garden.

If teachers feel that the flower garden should be more than just a place for working off surplus energy, or for producing beauty for the sheer love of it, then they will find in the flower garden an excellent and a superior laboratory for teaching science. Cross-pollinating, grafting, pruning, transplanting, spraying, mulching, watering, storing, cultivating, planting, and selecting your garden flowers offer a greater variety of opportunities for learning what plants will do than are to be found in the usual biology workbook. If gardens can be maintained over a number of years, as they should be, the stories of annuals, winter annuals, biennials and perennials may be made meaningful. In some cases, an understanding of these variations in plant behavior are most worth while, since it is disappointing to plant a row of hollyhocks and expect the returns to come in too soon. This variation lends itself well to the idea that planning is essential to good results in most fields of human endeavor.

Apparent preferences plants may have for shade, bright sunlight, long seasons, short seasons, acid or alkaline soil, dryness or wetness, exposure to wind, or shelter from it, introduce new features that teachers may care to use in organizing their studies around the flower garden. In some cases, the needed conditions may be produced by the addition of chemicals, the erection of barriers, or the use of hot frames. This only adds to the recognition of the fact that man has been able to a considerable extent to make his environment meet whatever his particular

Filaree

By ALLEN E. WOODALL

The little erodium called "filaree",
With flowers violet-blue as northern eyes
Fills all the fields with feathery filigree
And points green needles at the summer skies,
For the flowers turn to needles, finger-wise,
And needles turn to gimlets made of straw,—
A flower of gnomish laughter and surprise,
As mad as anything Munchausen saw,
And after all blue eyes of the field have gone
They wink up slyly at me from the lawn.

EXPLORING OUR NATIONAL PARKS AND MONUMENTS

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A superbly illustrated, accurate and interesting book for everyone interested in our great national park system, or who plans to visit these magnificent reservations.

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This unique book provides explicit information about how to get to these natural primeval areas, where to stay and what to see. More comprehensive than other books on the subject. It presents vividly the reasons the national parks have been established; the principals upon which they are administered; the educational and spiritual benefits to be derived from a visit to them.

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needs may have been at a given time or place.

The school flower garden, properly managed in the spring, may offer abundant experiences suitable to meeting the vocational, economic, intellectual, civic, aesthetic and health needs of almost any individual. In the series of inserts that have been appearing in this magazine we have had units dealing with vegetable gardens, fall flower gardens and herb gardens. How many others can you or your pupils think of that should be considered? We have even given you one unit on the weeds that come into being in a neglected garden. Maybe we need one on indoor gardens, or one on the kinds of gardens you associate with a lily pool.

Certainly any school that pretends to do anything about gardens will want to see that it is well supplied with the accouterments of the trade. This means a goodly supply of representative seed catalogs, an abundance of the necessary tools that are kept in proper condition, marker sticks for locating the site at which an expensive or choice lily bulb is hidden underground for much of the year, sprays and powders for fighting insects and fungi, and reasonably adequate textbooks on the care of gardens and of the plants that grow in them. If you wish to make the job a real one, there is always plenty of book work that may be done. In fact, I rather think that with many persons the book work that precedes the establishment of a garden may also be the end of the garden. For this reason I do not think you should take the keeping of records too seriously, at least in a flower garden run on a strictly amateur basis. In any class of children there may be individuals to whom the keeping of records may have a genuine appeal. Where this is the case these youngsters should hardly be deprived of having fun as they see it.

Small Forests

Recent studies of our forest resources have revealed the very great part played by the farm woodlot and the small forest acreage. Management of such areas is important, and a recent bulletin entitled "Managing the Small Forest" should be in the hands of every owner of such a wooded stand. This is Farmers Bulletin #1989 of the U. S. Department of Agriculture.

Overseas Help

Several scientific groups are mobilizing to assist co-workers overseas, and word comes that the Relief Committee of the Sullivant Moss Society is seeking to aid workers in the field of cryptogamic botany, chiefly bryology and lichenology. Full information may be obtained from Dr. G. Sayre, Russell Sage College, Troy, New York.

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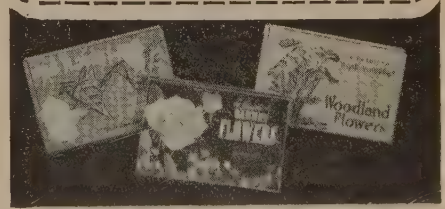

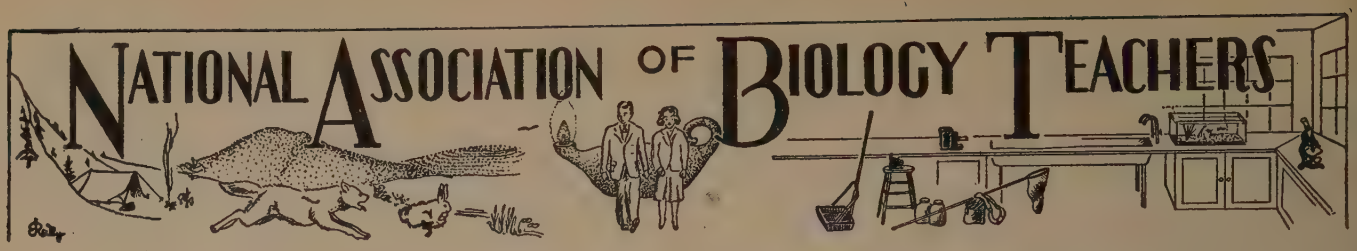

PATHS

By E. LAURENCE PALMER

ONE of the most stimulating experiences associated with attending national or regional professional meetings is thinking over afterwards what little or big ideas persisted after the "rat-race" was over. After the meetings of The National Association of Biology Teachers in Chicago, last December, I had occasion to think back in this way. Necessity demanded that I attend the meetings of more than one group, and I found myself evaluating this group against that one by simply remembering what ideas had been presented in the formal papers and in the informal discussion afterwards.

After I had given my paper before the NABT group, one young man came up, introduced himself and said that he wanted to have a talk with me. I managed to get in the time and found that he was teaching in a little school where apparently he alone had been able to glimpse the philosophy of our modern conservation. He was hard put to stem the tide that seemed to be running against him. He knew where the right path lay, but he did not know how to keep on it when there were so many real obstructions put in his way. Having had similar experiences, I was able to understand his situation, but I confess I did not know just what to say to him since, of course, I had never been on his particular fighting front.

A few minutes after this young man had a talk with me, another came up with a slip of paper, which he wanted me to read at my leisure. It contained a bit of verse that he thought expressed in a few words what I had taken many to say. I thoroughly agreed with him, and felt duly humiliated that I had not been able to see the situation with the clarity displayed by the poet.

No sooner had the poet moved on than a young man came along with a prayer, which he said he had learned as a youngster and which he thought fitted beautifully the situation I had attempted to present. He was followed by a big, husky-looking man who wanted a carbon copy of what I had read to take it home to read to his principal, for some reason that I am sure was obscure to me.

I do not flatter myself that the talk I made was anything out of the usual. In fact I thought it was rather mediocre, but, even so, it brought to me several people who, by various pathways of experience, had somehow managed to reach the same crossway.

When I got home, I found a letter from one of the men who had talked with me at the meeting. He gave a lengthy quotation to show the fundamental nature of the philosophy we had been trying to develop and decried what it called the "sheep-paths" that so many people apparently prefer to travel. The more I thought about that phrase the more I liked it, and the more I think it might be used as a warning to all of us, particularly those who are teaching. We cannot afford to follow sheep-paths. We cannot type everything, reduce everything to generalizations, or teach everyone through a radio loudspeaker. As Roger Williams, in his book, *The Human Frontier*, says: "Instead of being concerned with man's digestion, we will need to think of men's digestions; instead of concentrating upon the education of man we will be interested in educating men; what men see will be more important than man's eyesight. The hypothetical concept of human nature will give way to a serious study of men's natures". At the risk of admitting that I am following a sheep-path by giving a quotation, I am willing to admit that I really like that statement.

The point I wish to make is that a convention of individuals with a common interest makes it possible for those who have, of necessity, made their own way in diverse areas to share experiences with others and gain strength thereby. The man with faith in poetry, the one with faith in prayer, and others with particular faiths bred by experience came together where our paths crossed. I, at least, profited by the contact. That is a value of association.

I have recently been in touch with many of the students who have worked with me through the years. Many of them are no longer working in the university atmosphere. Most of them are enjoying their work, but I cannot help but read into their replies to some of my inquiries that the thing some miss most is the opportunity to discuss their particular problems with others whose experience may be of value. It is in part because of the stimulation I get from sharing experiences with people that I maintain my membership in such organizations as the National Association of Biology Teachers and The American Nature Study Society. It is because of the specific help I can get on the facts of life, as represented by living organisms, that I have been a member of the American Nature Association since it first started publishing *Nature Magazine* more than a quarter-century ago in 1923.

In each of these organizations, there are groups who go more or less their own way, who follow sheep-paths made by their own cliques. But all of these paths come together once a month, or once a year, or at some other regular interval. Then, one brings his experience to another, and they go away better for the contact, I hope.

True, there are some paths that cross where conflicting interests come face to face. This is all to the good, of course. It pays now and then to be put on the defensive, to have to prove your point, and even now and then to find that what you thought was right was really wrong. Improvement rarely comes without it being necessary occasionally to overcome some serious obstacle, or to go back and make another type of attack on a problem. Sometimes this course becomes difficult when two different types of logic are being followed. If one group believes that right can be established by argument, by majority vote, by ward politics techniques, while another believes that the truth can be established by demonstration, by observation or by similar direct means, then there may well be conflict.

David Starr Jordan, in *The Guide to Nature*, commented on the merit of this latter philosophy as follows:

"When a child is at home, the sun rises in the East, the air is clear when the sun shines, and within his limited range of knowledge cause and effect stand clearly related. This relation to the world we call orientation, in its original meaning knowing which way is East.

"One primary value of Nature study is that it carries this orientation on through the affairs of life. The child, in the complex relations of society and of public affairs, is led to know which way is East, what are the real relations of cause and effect, what is truth and how it differs from mere opinion or sentiment.

"For the study of Nature gives a certainty as to certain facts which no waves of sentiment can change; it leads to a sure knowledge of some things which no weight of authority on the other side could possibly shake. 'This is the value,' Agassiz once said, 'of the study of Nature herself. She leads us back to absolute truth, wherever we may wander.'"

This, I think, suggests one of the paths I have found greatest pleasure in following. I hope that you may like it too.

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Knowing Trees

Knowing Your Trees. By G. H. Collingwood and Warren D. Brush. Washington, D. C. 1948. 312 pages. Illustrated. $5.00.

This volume has become a standard work since the first edition was published in 1937. Seven printings followed, including one revision. Now we have the ninth printing of a revised and enlarged edition, making an attractive and informative book. One hundred and fifty important American trees are included, each being treated with concise but readable text. This, in turn, is illustrated by pictures showing each tree in summer and in winter; its leaf, bark, flower and fruit; an excellent map showing the natural distribution of the tree. The book is in large size—approximately the size of a page of this magazine—and is, therefore, designed for home rather than field use. It is a valuable book both for reference and reading.

New Flower Book

Flowers of Prairie and Woodland. By Edith S. Clements. New York. 1947. The H. W. Wilson Company. 83 pages. Illustrated by 24 plates in full color. $2.25.

One hundred and twenty-five flowers of the East and mid-West are pictured in color in this attractive book, with correlative brief descriptive text.

Australian Sanctuary

Teeming with bird life, and rich in other fauna and flora, 832 square miles in the north part of Northern Territory, Australia, have been set aside as an absolute and inviolate wildlife sanctuary, according to a report from the Royal Zoological Society of New South Wales. The area involved is the Mataranka Tourist Resort, whose proprietor, Herbert Victor Smith, feels that complete protection of the region assures the greatest tourist attraction. Abundant bird life, including the rarer parakeets and northern finches, lives in the region, which is also rich in reptilian life, also protected. The Roper and Waterhouse Rivers provide habitat for the Johnston's crocodile, and for numerous wading birds.

Trail Conference

The Eleventh Appalachian Trail Conference will be held at Fontana Village, Fontana Dam, North Carolina, from June 26 to 28, inclusive. This meeting place was selected to give those present an opportunity to become more familiar with the little-frequented southern Appalachians south of the Great Smoky Mountains National Park. Following the conference sessions, several hikes are planned into this area. Full details may be obtained from The Appalachian Trail Conference, 1916 Sunderland Place, N.W., Washington 6, D. C.

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University of California, Berkeley 4, Calif.

NEWS FROM YOSEMITE

Anyone who has visited Yosemite National Park, plans to do so, or wishes to keep in touch with nature and history activities there will want to subscribe to YOSEMITE NATURE NOTES. $1 a year, twelve issues, including a big, special number on some one subject. 27th year.

Yosemite Natural History Association
Yosemite National Park, California

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SPRING COMES TO TRAPPER'S LAKE

(Continued from page 183)

get across, and finally returned to Big Trappers' Lake.

Thinking I could escape another way, I plodded around to the outlet. White River, usually a mild stream, was ranting along like the Mississippi. I was still a prisoner.

However, the hot wind had ceased and the new day was cooler. The runoff had been so terrific and so swift that many of the crags that had been snow covered yesterday were now bare. Trappers' Lake was over its banks in several places. According to my measuring stake, it had raised a total of two and one-half feet since yesterday morning! Although the crashes and slides continued at lengthening intervals, the bulk of the water had rushed on down to the valleys. At four o'clock that afternoon I was able to cross the streams to Little Trappers' Lake and make tracks for the Stillwaters. So much snow had vanished that my skis were useless. As I hurried across the high country, I saw a big gray woodchuck blinking on a rock.

"Hi, old-timer!" I said. It was good to hear his shrill bark again. Spring had come!

Near dark I reached the Stillwaters where a worried Henry Head had made a second trip to meet me. We had a difficult time driving down to Yampa because mud and water were everywhere and a couple of bridges were washed out.

"I don't know where in Sam Hill all this water comes from!" growled Henry.

Well, I knew! I certainly did!

A TROPICAL IDYL

(Continued from page 189)

the living room, followed by the appearance of Alfie himself.

"Alfie," we all exclaimed delightedly. He advanced confidently, but with the dignity and poise an added year had brought. But he responded to our affectionate pats as though he still were the playful pet of other days.

"Where have you been?" we demanded, in the manner of people relieved after a long vigil for an absent one. He seemed to sense our question as he looked mutely at us, unable to tell where he had been; why he had not come before; why he had come at last; whether he had been prowling in the neighborhood and had heard our voices, or if some nostalgic memory had impelled him to seek us.

The unexpectedness and mystery of his visit cast a certain solemnity upon us. It seemed more in the nature of a final leave-taking than a homecoming. And so it proved, for we never saw Alfie after that night.

We were grateful, and truly humble, for the faithful remembrance of our jungle pet, feeling ourselves a part of something unexplained and unexplainable. In talking it over we agreed with Kipling that there are "more things true than are told," and, out of thoughts engendered by our recent experience, we added, *than are known.*

CORK TREE FROM SPAIN

(Continued from page 203)

on the Peter Smith estate was planted by Spanish pirates to mark the site of buried treasure. Every few years the legend is revived and small boys who take the tale seriously can be seen digging around the roots of the aging tree. The chest of gold has never been located, but the periodic digging has served to keep the cork tree cultivated.

The best cork does not grow on rich land, but on poor, eroded acres. It promises the wornout farms in the South a new cash crop. The trees do grow fast on rich soil, but they produce low-quality bark.

A cork tree has two layers of bark. The inner one, which carries the life fluids, is similar to the bark of other trees. The outer bark, however, is light and thick and can be easily stripped from the trunk. After it is stripped away another grows and takes its place. The first harvest is taken when a tree is seventeen years old, and the outer bark may then be harvested every tenth year for the next 150 years. Some trees will live as long as 250 years.

Stripping is done with a sharp hatchet. The bark comes off in long strips, and an expert can remove from 300 to 750 pounds a day. Once stripped, the bark is dried a few days, then boiled in huge vats for thirty minutes to remove water-soluble materials and make it soft and pliable. It is then baled and shipped to market, where it brings about twenty-five cents a pound and sometimes as much as six hundred dollars a ton. The discovery and plan of Charles McManus can mean more than a domestic source of the important material; it can mean a profit to the cork farmer.

Old World countries that have supplied the world with cork for 2000 years must move over and make room for a new competitor. Our scientists are determined that American cork will meet American demands.

ANSWERS TO COLOR QUIZ

A. 1—c; 2—e; 3—a; 4—b; 5—d;
B. 6—j; 7—h; 8—i; 9—f; 10—g;
C. 11—n; 12—k; 13—o; 14—m; 15—l;
D. 16—t; 17—s; 18—p; 19—r; 20—q.

SCHOOLROOM IN THE WOODS

(Continued from page 204)

Some one hundred high school boys and girls and their teachers, along with a large turnout of local townsfolk, crowded into the little sunlit clearing just inside the forest where a large speakers' platform and benches for visitors had been set up. From many parts of the West came forestry and lumber industry notables, educators, newspaper editors, and government officials.

From the heights, and through openings here and there among the pines, visitors looked out upon a splendid panorama—range after range of mountains, dark-wooded, and banked imposingly against the skyline. White clouds drifted lazily across their rounded summits. Far down in the little valleys, wedged in between those ranges, were irrigated lands of farmers and ranchers.

Following the preliminaries, President R. L. McNett of the lumber company presented Superintendent of Schools Albert Ayars with a deed of ownership to the property. Dr. Gordon Marckworth, dean of the University of Washington forestry school, at Seattle, thus summed up the significance of the occasion: "I see here something that in time may well spread to many other parts of our country where perpetuation of the forests is so vitally important. I know of nothing else just like it in our American public schools system. I see this as laying new foundations in forest conservation in America."

SEEING A BILLION LIGHT YEARS

(Continued from page 210)

will not be favorably placed for observation this month, as it will be in superior conjunction with the sun on April 29. Mars will be found in The Sickle in Leo this month, passing in a southeasterly direction during the month in the direction of Regulus. It will be high in the eastern sky at sunset and visible the greater part of the night. It is now decreasing rapidly in brightness, but at the beginning of April is brighter than all stars except Sirius and Canopus. At the end of the month it is almost exactly equal to Saturn in brightness. The ringed planet is in Leo throughout the month, a few degrees west of Mars. Jupiter is now in Sagittarius and rises shortly before midnight.

There will be a small partial eclipse of the moon on April 23. Only three-hundredths of the moon's diameter will be covered by the earth's shadow at time of greatest eclipse. This eclipse will be visible in the Indian and Pacific Oceans, Australia, Asia, the Antarctic regions, and extreme western and northwestern part of North America.

THE READER'S MARKET

A place where members of the American Nature Association and readers of Nature Magazine may find many interesting offerings or may advertise themselves, at low cost, for things wanted; things they have for Sale, for Trade, for Sale or Trade. This is an excellent forum for acquiring or disposing of such items as binoculars, books, cameras and photographic equipment, magazines, sports and outdoor equipment, etc.

GENERAL REQUIREMENTS APPLICABLE TO CLASSIFIED ADVERTISING

1. *Transactions based on good faith:* Transactions are based on good faith and mutual satisfaction. Deliberate misrepresentation, disregard of usual business ethics or the attempt to circumvent these general requirements, when brought to our attention, will result in refusal of further advertising.

2. *All orders subject to these conditions:* We reserve the right to edit all copy to conform with our standards and to reject or discontinue any advertisement which we consider undesirable.

3. *Who may advertise:* This department is an open market trading post. Any individual or firm whose advertisement and methods of doing business meet our requirements may advertise their goods or services.

4. *Rates:* All classified advertisements must be accompanied by remittance. The rate is 15c per word including name and address—minimum charge $2.00. Cash with order.

5. *How to count numerals etc.:* Groups of figures are counted as one word. Abbreviations consisting of initials or single characters likewise are counted as one word. Hyphenated words are counted as two words.

6. *"For Sale" ads must state prices:* A specific price must be stated on all FOR SALE ads —except that the phrase "write for catalog" may be used when listing real estate or merchandise in quantities.

7. *Conditions of trade or sale:* The condition of binoculars, cameras, instruments, other equipment useful to outdoor lovers, home-owners, etc., advertised for sale or trade must be specified as follows: PERFECT—meaning factory condition; EXCELLENT—meaning new condition, implying negligible amount of use; VERY GOOD—meaning practically new condition, implying little use, with no appreciable wear and only minor surface scratches or wear; GOOD—meaning moderate condition and with only moderate wear; FAIR—meaning no parts missing necessary to use, reasonable wear inside and out; POOR—meaning marred appearance or badly worn.

8. *Non-specific phrases barred:* Phrases such as "highest" or "top prices paid", as well as any other so-called "auction-type" phrases are not acceptable. The terms "fair price paid" or "state price wanted" may be used.

9. *Blind ads not acceptable:* Box number or blind ads will not be accepted. Give your complete name and address to insure prompt delivery of all mail or telegraph replies.

10. *Requesting privilege of examination:* Purchasers desirous of examining merchandise before acceptance should request shipment by express C. O. D. with examination privilege. This procedure permits the purchaser to inspect the merchandise in local express office and authorizes the express company to return unsatisfactory merchandise at shipper's expense.

11. The association will not accept for publication in NATURE MAGAZINE, advertisements of firearms, ammunition, or patent medicines.

12. *Responsibility for illegible copy:* Type or print advertisement plainly as we cannot be responsible for errors due to illegible writing.

13. *Closing date:* The closing date of all advertisements is the 20th of the second month preceding month of issue.

BIRD HOUSES

MADE OF THICK cypress wood, with special attractive rustic finish. Model 1A for wrens, chickadees, nuthatches, and downy woodpeckers. Model 1B the same except with larger entrance for bluebirds. Roof easily removed without tools for cleaning or inspection. Corners and edges rounded; outside surfaces roughened. Price $5.00. Above models with brown stain finish $4.00. Satisfaction guaranteed. John Logan, 1421 County Ave., Texarkana, Ark.

BOOKS

FLOWER LOVERS—Join the Bulb of the Month Club—Send today for free copy of "How to Grow 12 Rare Flowering Bulbs in Your Home". Send 12¢ stamps or coin to cover handling. You will receive full details of Club and inivtation to membership. Bulb of the Month Club—125 Madison, Dept. NC, Chicago 3, Illinois.

ADVENTURES IN WILD KNOWLEDGE! Exciting new trails to outdoor science. Adapted to schools, scouts, summer camps. Free samples. Naturegraph Company, 225 Main St., Los Altos, Cal.

INSTRUCTIVE NATURE GAMES. For field trips, hikes, camps, and schools. NEZ-BITS. Yarns, verses, and stories for campfires. 75¢ each. Paul Nesbit, Estes Park, Colorado.

NEW SPRING BOOK catalog on birds, mammals, reptiles, trees, flowers, insects, etc., ready for mailing. Send stamp. Fred J. Pierce, Winthrop, Iowa.

COLLECTOR'S CATALOG: National Geographic, Arizona Highways, other magazines and books. Send 10¢. Jack Hellar, P. O. Box 2507, Los Angeles 53, California.

BOOKS! Hard-to-find and out-of-print our specialty; All subjects. Send Wants! Jaher Book Service, 620-N East 178th St., New York 57.

FREE BARGAIN CATALOGUE of books. All subjects. National Booksellers. 1182 Broadway, New York 1.

ANGLING, HUNTING, and NATURE books, new, used and rare. Request free list. Sporting Book Service, Dept. D, Rancocas, N. J.

BOOKFINDERS! (scarce, out-of-print, unusual books) Quickly supplied. Send wants. Clifton, Box 1377nm, Beverly Hills, Calif.

"God's Creative Forethought," 35¢. Christian Evidence League, Malvern, New York.

BOOKS WANTED

WANTED: Copy of Bentley and Humphreys: "Snow Crystals". State price wanted and condition. Ben Laposky, 301 S. Sixth, Cherokee, Iowa.

BUTTERFLIES

SOUTH AMERICAN 18 different $1.50; Indo-Australian 10 different $1.50; North American 20 different $1.50; Papilios-Exotic 25 different $6.00; Map, Leaf, Owl, and Morpho butterflies for $2.00. Postage, packing 20¢. Large stock; want list filled. Michael's, 7415 3rd Avenue, Brooklyn 9, New York.

LIVING SILK MOTH cocoons 15 for $1.00; Luna, Imperialis 60¢ each; Polyphemus $2.00 dozen; Io $2.00 dozen; Mixed Pupae $1.25 dozen. Postage extra. Dr. R. Miller, Box 47, Station "E", Brooklyn 7, N. Y.

BUTTERFLIES: 2 world tropicals including gorgeous Urania $2.00; 20 India including Paris Swallowtail $2.00; 20 Burma including Giant Orange Tip $2.00. M. Spelman, 2781 Grand Concourse, New York 58, N. Y.

LIVING COCOONS: 15 assorted including Luna, $2.00. M. Spelman, 2781 Concourse, New York 58, N. Y.

DOGS

REGISTERED Redbone and Blacktan coonhound pups. Parents A-1 cooners. Illustrated folder, 25¢. W. B. Frisbee, R-1, Clarence, Missouri.

FIELD GLASSES

TELESCOPES, BINOCULARS, Microscopes—big bargain, catalog free. Brownscope Company, 24 West 45th St., New York.

PRISM BINOCULARS—French make—excellent condition—central focus and correcting adjustment. Complete with case—12x35mm—$80.00. James Davidson, College Station, Berrien Springs, Mich.

HOBBIES

ILLUSTRATED REPTILE CATALOGUE 1948, 10¢. Current Reptile Bulletin, 5¢, 8 issues 25¢. Hobby catalogue, curios, specimens, supplies, natural history books 10¢. Chameleon 25¢. Snake "den" $5.00. Mealworms 50¢ hundred. Quivira Specialties, Topeka, Kansas.

HARNESSING THE EARTHWORM. At all book dealers. Author will mail a valuable free booklet on "Successful Earthworm Breeding." Thos. J. Barrett, Dept. 17, Box 488, Roscoe, Calif.

METALIZE BABY SHOES for pleasant profits. Many methods. Details free. Enterprise, Box 189-NM, Wilkes Barre, Pa.

YOU CAN ENTERTAIN with chalk talks. Catalog 10¢. J. G. Balda, Cartoonist, Oshkosh, Wis.

HOMECRAFTERS

"LEATHER AND METAL CRAFT! Fine leathers, tools, accessories; copper, brass and supplies. Free catalogs. Kit Kraft, 3203 W. Washington Blvd., Los Angeles 16, Calif."

MAKE-IT-YOURSELF

"CONCRETE BLOCK HOMES". 32 page booklet; drawings, instructions on how to build. $1.00. H. C. Lightfoot, Civil Engineer, Richboro 23, Penna.

INSTRUCTIONS HOW TO make rubber stamps—Luminous Paints—Money from Sawdust—Resilver Mirrors—Raise Earthworms. 25¢ each, all five $1.00. Davies, Box 1087-N, Kingston, Penna.

MAKE BEAUTIFUL MIRRORS from ordinary window glass. No expensive equipment required. Details free. Tesco, Box 189-NM, Wilkes Barre, Pa.

MINERALS

"ROMANCE IN STONES." Arizona rare minerals. Collectors or museum grade, 12 miniatures, assorted, colorful, brilliant, genuinely rare, $3. Sam Parker, 620 North Third St., Phoenix, Arizona.

MISCELLANEOUS

ANY TIME is Vacation Time at Seneca Lodge, Watkins Glen, N. Y. Site of famous Gorge. Send for Folder.

ELECTRIC PENCIL writes, engraves all metals. $1.00 postpaid. PETERSON'S, 315 23rd Avenue, No., Minneapolis 11, Minn.

POWERFUL MENTAL TELEPATHY, Practical. Free Literature, Elgin Johnson, 912 Benton, Nashville, Tenn.

PHOTO FINISHING

5 x 7 BEAUTIFULLY COLORED photographic enlargement—$1.00, made from any size negative. "Fascinatingly and attractively different!" Color Craft Studio, Danbury, Iowa.

PIGEONS

BOOK OF THE PIGEON—256 fascinating pages; 230 splendid photographs. 70 varieties, also doves. Practical information—housing, feeding, breeding of fancy, racing, utility pigeons. Satisfaction assured. Only $3, postpaid. Order today! Pigeon Loft, Sherman Oaks, Calif. (Circular free).

KEEPING A TADPOLE-ARIUM

(Continued from page 190)

round, have become definitely frog-like, with bulging eyes and square jaws. Looking closer, you see that their tails have shortened and tiny leg buds have appeared.

Tadpoles develop their legs by using up the fat stored in the long tail. They develop the hind legs first, then the front ones. During this change you should put in some small chips of wood or cork; the tadpoles are becoming air breathers and like to stay out of the water part of the time. They sit longer and longer on these floats, propped up by their short tails and weak new legs. Finally the stump of a tail disappears and the frog is at last completely adapted to live on land and feed on insects, which he catches in mid-air by a quick leap and a flash of his long tongue.

During this period of change a tadpole-arium will show tadpoles in every possible stage of development—some plain tadpoles, some with hind legs only, and some with four legs and a stubby tail. Finally all the tadpoles have changed over, and your tadpole-arium is really a sight—full of little, one-inch green frogs, all sitting around very solemn and dignified on the cork rafts, and watching the big new world with their bulging, serious eyes.

About Hamsters

"The Hamster Manual" is the title given to a 42-page booklet prepared by Albert F. Marsh, hamster specialist of 1514 Basil Street, Mobile 17, Alabama. The author intends the booklet to aid anyone interested in the successful breeding and raising of Syrian golden hamsters. He presents data on the interest, usefulness and profit of raising the animals, as well as the problems and work involved. Hamsters are easy to raise, but they must be treated differently from other animals because they are themselves different. Mr. Marsh sells this booklet for one dollar, and anyone planning to work with hamsters would do well to provide himself with a copy.

Jefferson

Thomas Jefferson among the Arts. By Eleanor Berman. New York. 1948. The Philosophical Library. 305 pages. Illustrated. $3.75.

The versatility of Thomas Jefferson is proverbial. He was statesman, philosopher, musician, architect, astronomer, geometer, physicist, jurist, and, besides, possessed a wide knowledge of the biological sciences. In this book the author explores Jefferson's catholic interest in the arts and the practice of them.

Guide to Gold Country

"A Guide to the Mother Lode Country" is the title of the January, 1948, issue of *Yosemite Nature Notes,* the monthly publication of the Yosemite Naturalist Department and the Yosemite Natural History Association. It is the work of C. Frank Brockman, and an interesting, timely and valuable contribution to the history of the gold country. Mr. Brockman regards this 50-page booklet as designed to stimulate those whose interest in the Mother Lode Country is dormant. He feels that this publication is a sort of appetizer, whetting one's desire for a more satisfying "historical banquet" through further reading. A list of selected references opens the door to such a literary banquet, and Mr. Brockman's discussion certainly makes one wish to pursue the subject in detail.

This is a special number of *Yosemite Nature Notes* and sells for fifty cents, being available from the Yosemite Natural History Association, Yosemite Park, California. The several special numbers that have been published, in addition to the always interesting monthly publication, make one wonder why everyone who is interested in Yosemite does not belong to the Natural History Association. For a dollar a year members get all the publications, special and regular, and that is certainly a bargain for anyone. The Association has done a long and notable service in acquainting visitors with the true and broad significance of the Park. It seems to us that anyone who has been to Yosemite, or who hopes to go, is missing a bet if he or she fails to keep in touch with the Park through this means.

Birds in Flight

Wing Tips: The Identification of Birds in Flight. By Roland Green. New York. 1948. The Macmillan Company. 64 pages. Illustrated by 54 drawings by the author. $1.75.

This book is intended for the average bird lover and is designed, as the title indicates, to aid in the identification of birds on the wing. It is the work of a British bird artist and ornithologist and is about British birds. It is, therefore, only partly applicable to our American avifauna, but the book is of interest, nevertheless, to all bird students.

Gadgets

American inventive and manufacturing genius is really on the march if we may judge by the number of releases we receive publicizing new gadgets and devices. These come to us, of course, seeking a bit of free advertising. Some of the things only remotely touch on our field of interest, but we might be lax if we did not at least mention some of them to our readers, even though briefly. So here goes.

The Pond Garden Tractor Company of Ravenna, Ohio, has introduced two new, low-cost models of their Speedex garden tractors. Looks like a fine machine in the picture that came with the release, showing a pretty girl running this answer to your Freedom Garden problems.

For people who make mistakes on a grand scale, Chicago Wheel and Manufacturing Company, Chicago 7, Illinois, has produced an electrically driven hand eraser called Handee.

Of interest to gardeners is a new Simplex Soil Testing garden kit developed by the Edwards Laboratory, 3295 West 130th St., Cleveland 11, Ohio, to sell for $3.75.

Fire Fear

From Miss Addie Hodgkins of Lamoine, Maine, by way of a friend, Dwight W. Williamson, to whom she wrote in Montrose, Colorado, come some observations on last fall's tragic fires at Acadia National Park in Maine. Besides describing the larger property loss, Miss Hodgkins says: "Anna Rich, a woman up to Town Hill, told me that when the fire was very near them the squirrels and the field mice would come right up to her feet as if begging protection, and the deer came off the Island in droves, many of them swimming across the bay. They are very tame and hang around the houses and gardens and apple trees in the early morning and at evening."

Weather Magazine

Weatherwise is the name of a new magazine to be published bi-monthly by Amateur Weathermen of America, Franklin Institute, Philadelphia 3, Pa. This newcomer made its bow with the February, 1948, issue as a 20-page publication under the editorship of Charles A. Federer, Jr. Subscription is three dollars a year.

Green Thumb Medals

Silver Green Thumb Medals have been awarded for 1947 to The Firestone Tire and Rubber Company for its continued sponsorship for 32 years of its employee garden program; to Dr. Liberty Hyde Bailey, "Dean of American Horticulture"; to Paul R. Young, Cleveland School Garden Supervisor. These awards are made by the National Garden Institute for distinguished contribution to gardening.

A Golden Book

The Weekly Reader Parade. By the Editors of My Weekly Reader. New York. 1948. Simon and Schuster. 116 pages. Illustrated in color and black and white by Rudolf Freund, Clayton Knight, Henry C. Pitz, and Alice and Martin Provensen. $1.50.

This is one of the delightful and attractive Golden Books, designed for a younger audience. The text covers a wide variety of subjects, and includes fourteen articles dealing with Nature subjects.

Caring for Your Dog

Keeping A Dog. By Major R. F. Wall. New York. 1948. The Macmillan Company. 138 pages. Illustrated. $1.75.

We assume that the details of caring for a dog are not essentially different in Great Britain than in the United States, although the problems of feeding must currently be quite different. This handy little volume, first published in London, is the work of a distinguished British veterinarian. It is a complete handbook, presenting its advice simply and practically.

Camp Helps

Recently we came across a list of materials that should be of special interest to camp leaders, both trained and inexperienced, as well as to anyone working with outdoor groups in recreation, with Scouts and others. This material has been gathered by Barbara Ellen Joy and her associates, and a list of the material may be obtained from Camp Publications, 6 High Street, Bar Harbor, Maine.

Minnesota Speaks Up

Some excellent conservation advice is coming from the Minnesota Emergency Conservation Committee, of which Charles L. Horn is chairman and O. L. Kaupanger is secretary. We like it because it pulls no punches. We have no idea how extensively the committee is able to send out its releases, but if you are interested you might drop a line to the committee at 2300 Foshay Tower, Minneapolis, Minnesota.

Canadian Wildlife

Greater weight is given to the conservation and management of Canadian wildlife resources through the establishment of a new Dominion Wildlife Service under the Department of Mines and Resources at Ottawa. The Service will be under the direction of Dr. Harrison F. Lewis, who has been Superintendent of Wildlife Protection in the National Parks Bureau. The new service will attend to the conservation of game and fur resources of the Dominion, conduct research, and generally oversee wildlife management.

Eastern Puma

Conclusive proof that a small remnant of the eastern puma, supposed to have been extirpated for sixty years, still exists in New Brunswick, is offered by Bruce S. Wright of the Northeastern Wildlife Station of the Wildlife Management Institute at the University of New Brunswick. Their numbers are very small and not believed likely to increase because of their low breeding potential. It is hoped that absolute protection of the animal from hunting and trapping will be provided by regulations.

Mathematics and Biology

Mathematical Theory of Human Relations. By N. Rashevsky. Bloomington, Indiana. 1948. The Principa Press. 202 pages. $4.00.

This is Number 2 in the Mathematical Biophysics Monograph Series, and carries the subtitle "An Approach to a Mathematical Biology of Social Phenomena." We can, we fear, do no more than record the appearance of this volume, since, after successfully passing our college entrance examinations—a long time since—in algebra, we have always quailed at equations. These cryptic devices dominate this book, and express the author's reduction to equations of biology and human relations.

Eastern Birds of Prey

Birds of Prey of Northeastern North America. By Leon Augustus Hausman. New Brunswick, N. J. 1948. Rutgers University Press. 164 pages. Illustrated. $3.75.

In this attractively printed book Dr. Hausman, distinguished ornithologist, adds another volume to the literature that presents a true picture of our birds of prey and their place in Nature's scheme. With interestingly written and accurate text, the author describes the life histories and habits of the American vultures, the American hawks, eagles and their kin, and the owls. Gradually these birds, after generations of prejudice and misinformation, are gaining better understanding and more and more friends. Dr. Hausman's book should add to the numbers of the latter.

FOR THE JOY of ORGANIC GARDENING

ActivO makes rich, activated compost-fertilizer quicker, better, easier, cheaper from waste . . . leaves, garbage, etc. . . . (reduces garbage without odor!) . . . Activates, conditions and sweetens soils . . . Stretches and improves chemical fertilizer. Many other uses. Organic, Bacterial, Odorless. At dealers. Or, trial size for 450-lb. compost, $1.00, postpaid.

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ORTHO, INC., Dept. 97D, 2700 Broadway, N.Y.C. 25

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Imported Briar Pipes

Amazing Offer! Same imported briar as our regular $10 pipes. Have only surface flaws. Superb smoking. Limited quantities. Order today

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SEEDS. Australia's National Flower—Golden Wattle; Cootamundra, Silver Wattle; Kurrajong, Flame tree; Flowering Gum; Bottlebrush; White, Yellow Lucurne Tree; Assorted Tree, Wildflowers, Chocolate-flower, Scarlet Runner. $1.00 packet. Register Notes. J. J. Alderson, Havelock, Vie, Australia.

QUALITY NATIVE PLANT Seeds, 1947 crop. Cardinal Flower, Turtleheads, Bunchberry, etc., Free list. Valley Gardens, Dept. 1, 21301 Telegraph Rd., Detroit 19, Michigan.

WILD FLOWERS, evergreens, trees, shrubs, perennials-vines. 75 strong ferns $5.00. Catalogue. THREE LAURELS, Marshall, N. C.

POEMS WANTED

POEMS WANTED FOR MUSICAL SETTING. Send poems for immediate consideration. Hamann Service, 590 Manhattan Building, Milwaukee, Wisc.

POULTRY & SUPPLIES

RAISE Fryers new easy way. One-Man Home Plant earns $500 monthly. Booklet Free. Poultry Guild, 1046-K So. Olive, Los Angeles 15, Calif.

SEA SHELLS

SHELLS FOR SALE. Land and Marine; Cape Cod. Special 12 for $1.00 in box; Lists on request. Mrs. F. K. Hadley, Box 33, West Newton, Mass.

SMALL ANIMALS

5 CENTS DAY starts $1,000 pair Chinchilla ranching. Complete booklet $1.00. Montana Fur Farm, Billings, Montana.

SPORTING GOODS

5000 BARGAINS, Firearms, war relics, binoculars, catalog 40¢. John's Gunshop, Runnemede, New Jersey.

STAMP COLLECTING

FINE APPROVALS. Fast, personal service. What countries do you prefer? I'll send their stamps. Philo Skinner, 438 Locust, Long Beach 12, California.

TAXIDERMY

GLASS EYES. Made in OUR factory. All kinds of Taxidermists' supplies. Complete catalog FREE. J. W. Elwood Co., 223 Elwood Bldg., Omaha, Nebraska.

TELESCOPES

SKYSCOPE, the new 3½" reflector. Precision ¼ wave aluminized mirror. Sixty power Ramsden type eyepiece. Equatorially mounted on sturdy metal legs. Used by schools, universities. Price complete $19.75. Write for descriptive literature. The Skyscope Company, Inc., 475 Fifth Ave., New York 17, N. Y.

WRITING

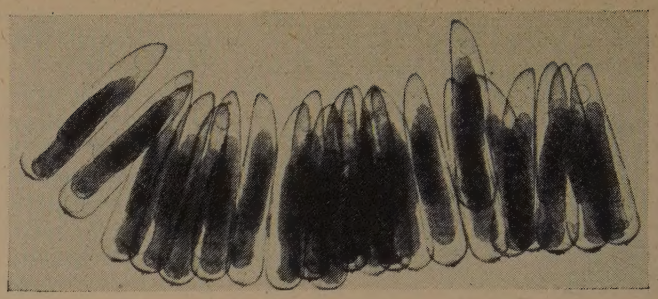
SELL IN THREE MONTHS OR MONEY BACK If you can write correct English—You can write Juveniles. I have sold some 3000-3500 stories . . . articles . . . editorials . . . serials . . . series. Now I'm teaching. "Instruction—Criticism—Collaboration." Write Dept. N for terms. Will Herman. Author of "My Juvenile Success Secrets" and "My Formula for Fiction." 5703 Broadway—Suite No. 4, Cleveland, O.

I WANT New Writers to cash hundreds of checks for $1 to $100, offered each month. The easiest way to write for pay. No previous experience necessary. Send for free details. No obligation. Saunders M. Cummings, 467-N1 Independence Building, Colorado Springs, Colo.

Under the Microscope

By JULIAN D. CORRINGTON

PHOTOMICROGRAPHS FROM SLIDES COURTESY WARD'S NATURAL SCIENCE ESTABLISHMENT, INC.



Egg raft, *Culex pipiens*, 35X.

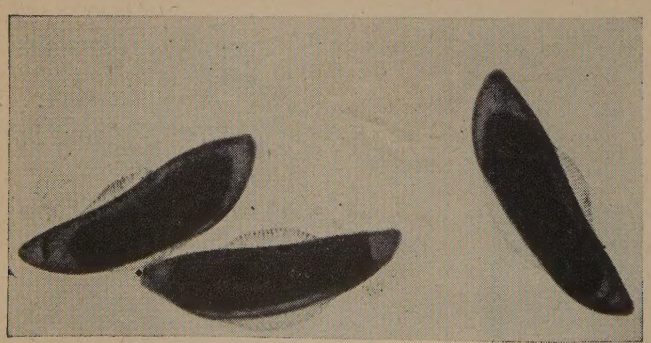
MOSQUITOES

II. Eggs

With the majority of small animals, the eggs constitute a more or less unimportant stage for general study by man. Sea urchin eggs are edible, insect eggs are mounted by amateur microscopists for their great beauty of form and color, and ant "eggs" (actually the pupae) make fine food for captive small turtles and fish. These are odds and ends of uses, but there are two groups of animals, taken up in connection with parasitology or public health, in which the egg stage of the life history comes in for its share of close attention—the parasitic worms, and insects of medical importance. Through identification of the microscopic eggs passed in the stool of a patient, the hidden, internal worms that produced them may be known, and suitable therapeutic measures begun. Observation of the eggs of *Anopheles quadrimaculatus* in a pool proves the presence in the area of that dangerous malarial vector.

Insect eggs, in general, exhibit a far greater range and diversity as to size, shape, number, composition, and superficial features than do those of any other group of animals. They may be as short as 0.1 mm. or as long as 6.0 mm. They may be round, hemispherical, elliptical, discoid, or shaped like a cylinder, cone, pyramid, vase, tenpin, or other more bizarre object. They vary from smooth to ribbed, fluted, spined, or more complexly sculptured, and from numerous plain colors to reticulated or intricately patterned. They are laid singly or in groups or masses of dozens, hundreds, and sometimes thousands, and all at one time, or over a season, or even a series of years, as with the social insects. They may or may not have an *operculum* or lid at one end for egress of the nymph or larva; if no operculum is present, the developed young insect must split the egg or gnaw an exit hole. Eggs may be laid with or without various cements, froths, bags, cases, webs, and the like, and free or floating, or attached to plants or animals, or placed within cells. Pages would be required to describe even a fraction of the innumerable variations among all these and other features.

An average insect egg consists of the living egg cell proper, or ovum, plus various accessory materials. Arthropods have *centrolecithal* eggs, a term descriptive of the peculiar arrangement of living protoplasm and lifeless deutoplasm, or yolk; a rim of cytoplasm around the exterior, with the yolk in the center. The nucleus lies in a small island of cytoplasm within the yolk mass and, after fertilization, divides many times to form hundreds of nuclei. These migrate to the peripheral layer of cytoplasm, which is then cut up into a large number of cells, arranged to form a blastoderm of a single surface layer. This process is termed *superficial cleavage*, and is a unique feature of the phylum.



Anopheles eggs, 60X.

The accessories, however, are what we see when we discover insect "eggs." There is a shell of two layers, and usually a vitelline membrane—all lifeless substances, secreted by glands, and responsible for all the external variety we have just discussed. One or more *micropyles* are present at one end—minute openings for admission of sperm cells at the time of fertilization.

As with reptiles and birds, an insect egg is not the same thing as an egg cell; the word "egg" in biology thus has two distinct meanings. Still more unfortunate for precision in designation is extension of the term "egg" to include all stages of development up to hatching. Thus, the egg shell of the hen's nest may enclose a fully formed chick, but this object is still called an "egg." It is well to remember that the word *ovum* has an exact meaning in biology—the egg cell after maturation and before cleavage, whether or not fertilized—whereas the vernacular word *egg* is only sometimes the equivalent of ovum and is more apt to indicate ovum-cases and embryonic stages. The expressive term *embryophore* (embryo-bearer) is in good repute among parasitologists to designate developmental stages in the various worm groups, as for tapeworm "eggs," and could well be adopted more widely. A case in point is seen in the accompanying illustration of the "eggs" of *Culex*, where it is apparent that the contents of the shells are embryos in an advanced stage of development; these objects should be known as culex embryophores. In a general discussion such as this, however, and where the degree of development is unknown or immaterial, the term "egg" is both customary and convenient, so we shall continue its usual employment.

Turning to the eggs of mosquitoes, they are spindle-shaped or cylindrical, and may be smooth, spiny, or provided with wing-like floats; they may be deposited singly, in clusters, or in rafts, and on land, snow, or water. Aside from their general interest or any part they might play in control measures or experimental work, the most important fact about mosquito eggs is their specific individuality;—to the trained observer they are quite as distinctive as are the larvae or adults, as a glance at the accompanying photomicrographs will show. To such an extent is this true that, as mentioned in the *Manual of Tropical Medicine (Military Medical Manuals, National Research Council)*, European specialists, studying *Anopheles maculipennis*, have distinguished seven groups in which the adults are apparently identical, yet the eggs differ in shape and sculpturing. Should these differences be held to designate races, varieties, strains, or species? This brings up the more general question as to the meanings of these terms and the significance of such differences, —a leading problem in present-day biological investigations.

In *Anopheles*, the egg resembles a capsule in shape, or is described as boat-shaped (navicular) or spindle-shaped (fusiform). Its most distinctive feature is a pair of *floats*, more or

Egg of *Aëdes aegypti*, 55X.

less elaborately sculptured, and which act as the name indicates. In some species there is also a beaded margin called the *frill*. These eggs are always laid in water, and are deposited either singly or in small clusters. After deposition, because of surface tension or some unknown polarization effect, the ends of separate eggs tend to run together, producing characteristic triangular and star-shaped patterns, involving three or more eggs. Hatching occurs in one to two days, and the eggs do not winter-over.

Culex eggs are laid in *rafts*, a feature shared with *Tæniorhynchus*, *Urotænia*, and *Theobaldia*. The shape of each egg is more or less cylindrical, the end that is the more pointed floating upward: there are no floats, frills, or other such ornamentation. In these genera, the eggs, averaging 200 or more, are always laid in water (*on* water is actually a more accurate description), hatch quickly, and do not winter-over.

Most culicine species lay single and separate eggs. *Aëdes ægypti*, dangerous vector of many pathogens, like others of its genus, lays single eggs, ovoid or paramecium-shaped. This species oviposits the year round, in and about the house, in any form of container that holds even a small amount of water. Hatching is rapid and there is no wintering-over of the eggs. *Aëdes triseriatus* and certain others are tree-hole mosquitoes, laying their eggs in situations of that character, while most other species of this genus deposit summer eggs in dried-out areas in marshes and stream courses, and these eggs winter-over, whether or not there is a return of water before spring.

Still different is the case of species of *Psorophora*, best adapted of all mosquitoes to take advantage of sudden and transient influxes of water. The eggs are extraordinarily well protected with thick and spiny shells, and are laid singly on the dry ground, in similar fashion and situation as with *Aëdes*. Here they may remain dormant for months or sometimes years, but should water arrive, as by a sudden thaw or downpour, the eggs hatch at once and the larval and pupal stages occupy but a few days so that adults may emerge before freezing or drying overtakes the pool.

Mosquito eggs may be collected from natural habitats but are secured with greater ease and certainty, as well as in greater number, by maintaining captive females in suitable cages. This method also permits the novice to identify the species more readily and learn specific egg characteristics.

All insect eggs are notoriously difficult whole mounts, owing principally to the likely inclusion of trapped air during the processing. An air bubble appears black, a refraction phenomenon; its buoyancy is apt to lift part of the object out of the clearer or balsam, giving that part a dried-out opacity; such specimens are worthless. The trapped-air problem is taken care of by (1) discarding all eggs that show these defects, retaining only perfect specimens; (2) using a vacuum pump, if one is available; or (3) pricking a hole with a fine needle in a surface of the egg that will lie on the bottom and thus be concealed when the egg is mounted.

Eggs for whole mounts are sufficiently fixed by the dehydrating agent, such as ethyl or propyl alcohol. Dehydrate slowly and thoroughly, over a considerable period of time, then prolong the clearing in similar fashion. If xylene will not give eggs free from objectionable air bubbles, try oil of cloves. Mount in balsam or synthetic mountant, using cover glass props for eggs of appreciable size. Store such slides perfectly flat, not on edge, and do not expose to the heat of a microprojector for more than brief intervals at any one time, and never when standing on edge.

TRADE NOTES

Mycology One of the most complex of all biological studies has to do with one of the lowest groups of organisms, the fungi. An immense amount of literature exists concerning these lowly plants, since they are so numerous, varied, important and, in certain aspects, so little understood. Yet textbooks, at least for American students, have been few and far between, and seldom sufficiently comprehensive. Reference works have often been either too vast and costly, or have stressed but a few of the many sides of the subject.

There has accordingly been need for such a work as *The Fungi*, in two volumes, by Professors Frederick A. Wolf, Duke University, and Frederick T. Wolf, Vanderbilt University. Vol. I discusses the history of mycology, isolation and cultivation of specimens, taxonomy, and treats in detail the developmental morphology of the five major groups: Myxomycetes, Phycomycetes, Ascomycetes, Basidiomycetes, and Deuteromycetes or Fungi Imperfecti. This is considered as the basic volume, laying the essential groundwork for the second book.

Vol. II is physiological and ecological. It deals with nutrition, enzymes, respiration, biochemistry, the effects of temperature, radiation, and substrate, spore dissemination and germination, host penetration, specialization and variation, associations, mycorrhizae, genetics, poisonous and edible species, medical mycology, distribution, plant pathology, fungus-insect interrelationships, and soil, marine,

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and fossil fungi—indeed a comprehensive coverage.

The work is intended as both text and reference. Each chapter is summarized and cites numerous literary references, and each volume has its own author index and subject index. Technical terms are explained by both text and illustration, the drawings and photographs being numerous and excellent. We were puzzled by the specific designation of *Morchella esculenta* as a poisonous mushroom in one place (II, 340, 349) and as a prized edible type in the next section (II, 351, 352). Also it would seem that the use of the same portrait as frontispiece for both volumes is a bit supererogatory. However, the typeset is unusually readable and free from error.

This is a work that no botanist or student of the fungi can afford to do without; an excellent work, able in design and execution, and of great interest and value. It is much better as two handy volumes than it would have been as a single unwieldy and weighty tome. I, pp. x, 438; figs. 153, $6.00. II, pp. xii, 538; figs. 82, $6.50. John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, 1947.

Genetics In these columns for May, 1944, appeared a review of Professor David D. Whitney's *Family Treasures*, explaining and illustrating normal human inheritance. The same author has now given us *Family Skeletons*, a most appropriately titled volume of the inheritance of human defects and abnormalities. As before, the aim has been to let photographs tell most of the story, the text being restricted to simple explanations. Defects are taken up by bodily structure, as those of the ears, eyes, hands, or feet. There are also interesting chapters on brothers and sisters, including twins; on developmetal defects and their probable causes; on environmental changes; and on methods used by modern science to correct many deformities as by plastic surgery. An important reference feature is the inclusion of two glossaries; one lists and defines 351 inherited abnormalities and diseases, while a second is a general glossary, including common terms used in genetics. Appended to each chapter is a list of source references and there is also an index, so that the general reader need not be distracted by technicalities, whereas the scientist can readily locate any data he may need. Pp. ix, 284; figs. 246. University of Nebraska Press, Lincoln, 1946. $4.00.

ADVANCED HINTS

Mounting Adult Mosquitoes

Mosquitoes are not among the easier subjects for insect whole mounts, due to their fragility and pigmentation. Yet they are not too difficult, and are certainly plentiful enough to provide abundant material for practice.

Specimens may be caught and killed by any desired methods. Killing may be effected in a cyanide or carbon tetrachloride jar, with chloroform or ether, or in a vial of water, alcohol, or turpentine. Place the dead insects in 3% peroxide of hydrogen or chlorox for 12 to 24 hours to bleach, then rinse in water and transfer to 10% cold potassium hydroxide for 24 hours. The lid of a baking-powder can makes a good receptacle for this work, but any glass vessel may be used. The tin lid is a good implement when potashed specimens are to be boiled; try a few of your insects this way too, heating them over an alcohol lamp for 30 minutes. In all cases, at the end of the required time, remove the specimens and wash them well in several changes of tap water to get rid of excess potash. Perhaps it is safest, as recommended by many technicians, to put next into concentrated acetic acid for an hour, to neutralize any remaining potash as well as to soften and swell the insect, although this step can often be omitted.

Now use the handle of a wooden dissecting needle, a round matchstick, the handle of the camel's-hair brush, or any such small cylinder and begin gently rolling the specimen from head to tail, like rolling out dough with a rolling pin. The purpose is to expel the internal contents through the anus; if properly done on material that has been sufficiently potashed, the rolling should work perfectly, clean out the insect completely, and leave nothing but the exoskeleton, without any injury such as detached legs, broken wings, or ruptured abdomen. If unsuccessful, try again, varying the length of potashing or using greater care in rolling. If the specimen resists such treatment and the interior parts are not expelled, it has been insufficiently potashed; if it goes to pieces, it has been overpotashed. Only experience will teach one the correct length of time for the process, which depends on the sizes and permeabilities of various objects.

Now the preparation must be positioned and hardened. It is first rinsed well in water; from now on, greater than ordinary caution must be exercised in handling the mosquito since it is in a more fragile condition and is easily ruined by harsh or clumsy manipulations. Pour off the water in the container and slowly add fresh water; agitate this water gently by sucking it in and out of a pipette; repeat until the water is clean and free from debris. Get beneath the object with a section lifter or blank slide and lift up, depositing it in a flat stender or syracuse watch glass containing 50% alcohol; then *position* the specimen, by which is meant straightening the body, adjusting the wings and separating the legs into a lifelike and symmetrical posture. The proboscis should protrude downward, free from any overlapping by the forelegs. Take a fine needle and, with the aid of a hand lens, slit the sheath of these mouthparts and separate the lancets so that none adhere and all may be seen distinctly. The antennae should be separate and not overlapped.

Once positioned, each part is then weighted down as may be necessary to prevent its curling up, adhesion, or other spoiling of the correct positioning. For this, use bits of broken cover glass, broken slides, particles of sawed or filed metal, short lengths of fine glass rod, or other convenient objects sufficiently small in size. Sometimes a tiny length of glass tube or rod can be wedged between two legs or two antennae so as to prop them apart. Once all is arranged, place a cover on the vessel and leave it undisturbed for 12 hours; after this very cautiously pipette off the alcohol and replace it with 70% alcohol for a like period, using care not to disturb the insect. At the end of this period, the mosquito should be hardened to the extent that future disturbances are not so likely; at the same time, it is rendered more brittle and hence increasing care should be exercised in subsequent handlings.

Go through the 82% and 95% alcohols for a few hours each in the same manner; then dehydrate as preferred and add the clearer. After an hour or so, work the specimen up on a slide held beneath the clearer, with as little disturbance as possible. Using a fine forceps, pick the object up by one wing, or use a brush and, assisted by the liquid, swim the mosquito to the center of the slide, flooding with the clearer to assist by floating. Align the specimen with the slide and make the final adjustments. The positions of parts cannot be changed, but slight disturbances can be corrected. Tilt the slide slowly to drain off excess clearer, then add balsam, cover-glass props, and finally the cover. Put the balsam alongside, not on top of, the specimen.

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